DATABASE SYSTEM SELECTION FOR MARKETING STRATEGIES SUPPORT IN INFORMATION SYSTEMS

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Abstract

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In today's dynamically changing environment marketing has a significant role. Creating successful marketing strategies requires large amount of high quality information of various kinds and data types. A powerful database management system is a necessary condition for marketing strategies creation support. The paper briefly describes the field of marketing strategies and specifies the features that should be provided by database systems in connection with these strategies support. Major commercial (Oracle, DB2, MS SQL, Sybase) and open-source (PostgreSQL, MySQL, Firebird) databases are than examined from the point of view of accordance with these characteristics and their comparison in made. The results are useful for making the decision before acquisition of a database system during information system's hardware architecture specification.

marketing strategy, database management system, database comparison, Business Intelligence, data integration

In present days characterized by the dynamics marketing and marketing strategies play significant role for the success of any company in the market. Knowledge of the market, customers, and their needs that form purchasing behavior are the most crucial. For good understanding of them a lot of information from the field of external environment factors, competitors, market, and sales is necessary. With the development of information and communication technologies it is unimaginable that for the creating, implementing, and controlling marketing strategies a good database management system is not used.

Today, a few dozens of relational database systems are available. They differ in the functionality that they offer, accessories, and finally in the price. Database systems as well as other kinds of applications can be divided into two major groups – commercial and open source products. The main criterion for the managers while comparing products from these two groups can probably be the price. However, it is necessary to re-alize that more important factors influencing the final decision for database selection are its functionality and the extent how the database fulfills the requirements laid on it.

Following parts of the paper deal with the specification of fields where a database system should offer sufficiently powerful instruments so that the database can facilitate the work when preparing, planning, implementing, and controlling marketing strategies. Subsequently the most wide-spread relational database systems are researched from the point of view of their functionality and their comparison is made.

The objective of the paper is to provide authors perspective on requirements laid on database systems from the side of marketing management, to provide an overview about currently available database systems and their possible utilization for marketing strategies support and evaluation of these systems in order to present information necessary for decision influencing a database system selection.

MATERIALS AND METHODS

Marketing activities management process consists, like every management process, from four main parts (see e.g. Mintzberg and Westley, 2001):
- current state analysis,
- plan creation,
- plan implementation,
- plan realization control.

Marketing strategies are plans that include all mentioned activities and are related to target markets, customers, and individual activities that have relationship to basic elements of marketing ("marketing mix"), known as "4P's" (see e.g. Kotler, 2000):
- product,
- price,
- place,
- promotion,

or newer version known as "7P's" that is applied mainly on the services market (Cooper, Lane; 1997):
- product,
- price,
- place,
- promotion,
- people,
- process,
- physical evidence.

It is necessary that all partial activities are in accordance with strategic marketing plan. Strategic marketing planning is conceptualized as a process of maintaining the match between organization resources and market opportunities. Considering the fact that the market orientation is presently very important and the purpose of all other activities connected with the business (such as production, research and development) must have a relation to the market, it is possible to substitute the concept of strategic management with the concept of strategic marketing management (Perreault, McCarthy; 1993).

The market orientation covers a group of activities from following fields (Cooper, Lane; 1997):
- collection and analysis of information about the market in past periods,
- prediction of future market trends,
- monitoring and evaluating organization performance,
- planning, implementation and control of marketing activities.

These steps include acquiring, storing, processing and presentation of information related to sales, products and services, organization structure, costs, distribution, competitors, customers, global economic indicators, research and development etc. Some of this data originate continuously in the organization and have operative character (a lot of data from the presence, they are the result of business activities), some of them enter into the data base from marketing research, some are the result of suitable selection, connection, and aggregation of primary data. Relevant information is subsequently used as input data for various marketing planning tools.

Important database features that are related to marketing strategies

Current database technologies provide many functions and have many features that facilitate smooth and powerful database operation. Following part of the paper briefly describes some of them and explains their relation to marketing strategies support.

Business Intelligence technologies

In the field of marketing strategies and marketing activities management Business Intelligence (BI) technologies can be successfully employed. Business Intelligence means the ability to understand the business process on the basis of business information analysis. These are collected from business processes and customer behavior from many sources and subsequently stored in enterprise database. Using various techniques necessary information can then be found there (Bloemen, Brunner; 2000).

Business Intelligence instruments are mostly used in following fields (Novotný, Pour, Slánský; 2005):
- Analysis of products and services from the point of view of costs, profit and relations to individual groups of customers or competitive products.
- Customer segmentation support.
- Marketing campaign planning, analysis, and evaluation.
- Analysis of logistical chains from the point of view of costs, delivery times, complaints handling, transportation services provided etc.
- Supplier relationships management – efficient purchase planning, evaluation and selection of suppliers etc.
- Observing customer behavior when using web communication interface (internet on-line shop, internet presentation of the company and its products, measuring the efficiency of individual electronic communication vehicles etc.).
- Measuring customer profitability.
- Measuring lifetime customer value.
- Measuring the risk of customer loss.

For efficient utilization of Business Intelligence instruments high quality integrated information is very important condition. The prerequisite is well done data architecture design with clearly defined data structure, quality, information location as well as specification of instruments and standards related to the integration.

Database systems play important role in the field of Business Intelligence. All database systems don't necessarily have to support all BI techniques, but some of them are often their components. These instruments can be divided into three groups (Bloemen, Brunner; 2000):

- ETL (Extraction, Transform Load) tools – tools for extraction, transformation, and storing information from external resources.
- Tools for data management – related to data storage and data management in the database.
- Tools for data access – tools for data presentation, OLAP and Data Mining technologies etc.

To gain useful information from Business Intelligence instruments very large data warehouses are often inevitable. That is why the performance and scalability are very essential database characteristics.

Integration

Today, the stress on integration within business information system is put more than in the past. The main reason is according Pour (2004) the rapid growth of the number and the size of used applications. Companies also see the advantages of the integration on data layer. Such integration is usually realized by custom-made interfaces that make entire system very complex and also not very flexible (Schulman, Friedman; 2004).

Data integration can be implemented by storing all data in one database or by connecting to necessary external sources through some interfaces. Both solutions have their advantages and disadvantages. Integral database will probably have better results in terms of the access speed and availability of all information. On the other hand, data integration into one resource can be too demanding in comparison to the need of information from external resources. The most advantageous seems the combination of both approaches.

Smaller number of databases leads to decrease of administrative costs by decreasing the number of servers and database systems that must be managed. Working with centralized data is also faster and leads to improved performance of applications working above integrated database. Data warehouse or Business Intelligence applications need centralized data, consolidation therefore enables their operation without the need of additional data warehouse creation.

When considering possible alternatives when choosing a database system from the point of view communication between the database and other applications or databases it is important to look over the rules of such communication. It is advisable that the database supports generally accepted standards or standards that are used by the software that communicates with the database.

Information interchange

Each successful company communicates with its environment in many ways. The environment is composed mainly from customers and suppliers who are the most important from the point of view of marketing. Other institutions that can be also useful are marketing research agencies, Statistical Office, information agencies etc. To make the communication meaningful, each communicating subject must understand the message from the others. The information is usually stored in business database in certain format. Databases in individual companies can be from different vendors and don't have to be necessarily compatible. Even in the case of same products from the same database vendor the way of storing the information may differ. Even when the database schema is the same, problems with remote access and security must be solved. Therefore, it is useful to employ certain standard that is comprehensible to all communication participants (Wyke, Rehman, Leupen; 2002). As a generally accepted standard that can be used for solving this problem is considered the XML. The ability of database to work with XML data (storing XML, generation of XML from data from database) is a big advantage.

Security and accessibility requirements

According Voříšek (2002) the information is one of the most valuable business resources. Therefore, the interest of each company is to store the information secure from its damage or incompetent access (nobody incompetent can see, misuse or damage the information).

The privileges that are intended for information access management can be divided into two levels. The first one deals with the authentication of the user, i.e. identification using user name and password. The other level deals with the access to particular data and the kind of the access to such data. The access privileges are very often handled at the application level but for sufficient security it is useful to solve this issue at the database level (for the case of information access without using an application). It is convenient to enable assigning individual privileges to individual users as well as to user groups. For easier privileges assigning the system of roles can be used (a role is understood as a set of privileges). It is better to store some data encrypted for better security (at least passwords), when using remote database access it is reasonable to communicate through encrypted channel.

Accessibility means the ability of the database to be accessed for software applications that request the information, the ability to recover after a failure (user or data manager error, hardware failure) and continuous operation even e.g. during the system maintenance

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(Kelly, 2004). For ensuring high availability huge financial resources are spent on special hardware, software or consultancy services. If the database incorporates tools solving this problem, automatic tuning, possibility of using computing power of more computers, support of simultaneous running of backup computers etc., such expenses can be dramatically reduced.

Some types of applications, especially e-shops, require 365/7/24 availability. This is dependent on co-operation of hardware and software that includes database server. The situations when a database is not accessible can be divided into two groups – planned outage (the change of database parameters, schema modification, hardware update etc.) and unplanned outage (hardware failure, natural disaster, user or application error). In both situations it is very important to know what actions should lead to following database operation restoration.

In order to be able to restore the database to particular state, regular back-up (full or incremental) must be performed. The advantage is when such back-up can be executed during standard database operation.

Transactions

Some operations related to insertion or modification of data that is later used in the process of marketing strategy formulation have the character of transactions (a group of operations that must be completed as a whole to make the transaction valid). If such conception of the information is not kept the presented information can be distorted which can lead to bad strategies.

This required integrity can be achieved in several ways. One of them is catching and handling of all exceptional states at the level of applications. However, this way of handling transactions is rather awkward, not very flexible and it is difficult for solving multiple user access. More possibilities are provided by database transactions implemented directly by the database server. All algorithms solving the access to the data (reading, inserting, and modification) already exist and are able to ensure the integrity without detailed knowledge of particular procedure.

In order to ensure the integrity of the database it is necessary that each transaction has certain characteristics. These are known under the abbreviation ACID:
- Atomicity – the transaction must be completed as a whole otherwise any of the executed parts is not valid.
- Consistency – after termination, the transaction must preserve the entire consistency of the database.
- Isolation – the results of the transaction are hidden from its environment until the transaction is confirmed.
- Durability – if the transaction is confirmed, all changes become permanent.

Scalability

The scalability is understood as the ability of a database to cope increasing demands resulting from increasing volume of processed data, transactions, and number of users. It is desirable that it is not necessary to change the application design and code (Bloemen, Brunner; 2000). Increased demands can be solved by using more powerful hardware or using higher number of connected computers that share their resources. The database server should also include functions that can solve the access of many users including transaction handling in such environment with many users.

Database characteristics related to marketing management

Characteristics of database management systems that were identified as crucial in relation to supporting marketing strategies need to be given into relations with marketing management tasks that are performed during marketing analysis, planning, and control. The fundamental for identifying marketing needs for particular database characteristic is the understanding of marketing tasks structure that can be found e.g. in (Kotler, 2000; Novotný, Pour, Slánský, 2005; Mintzberg, Westley, 2001; Turban, McLean, Wetherbe, 2001; Talvinen, 1995).

I: *Marketing management tasks in relation to database characteristics*

Database feature	Enabled marketing management tasks
Business intelligence	• Analysis of products and services (costs, profit and relations to individual groups of customers or competitive products) • Customer segmentation support. • Marketing data analyses (customer behavior, profitability, lifetime value, risk of customer loss, distribution channels and suppliers analysis, • Marketing campaign planning, analysis, and evaluation. • Creative and rational decision making • Marketing intelligence • Marketing control • Marketing performance evaluation
Data Integration	• Enabling effective and efficient utilization of business intelligence technologies • Streamlining flexible and integrated management and organization • Document driven decision making • Business applications integration
Information interchange	• Marketing research and competitive intelligence • Group decision making • The possibility of using new marketing channels • Streamlining flexible and integrated management and organization • Business applications integration
Security, accessibility	• Enabling reliable integration of internet technologies • Reliable tracing of business transactions
Transactions	• Enabling internet access and maintaining data consistency
Scalability	• Enabling smooth systems operation • Enabling flexible information handling • Complete support for electronic document (text, images, video etc.) handling in marketing channels as well as inside the organization

RESULTS

This section describes most famous commercial and open-source database management systems in terms of key characteristics that have relation to support of marketing strategies. Subsequently, comparison of the features based on various benchmark tests is made.

Commercial databases

Oracle

According Mullins (2005) is Oracle database the leader on the database server market. It is very complex solution that can be connected with other various products from the same company. Some of its characteristics are in following list:
• Suitable for large and medium-size companies.
• Includes tools for automatic database tuning and management.
• Supports working in grid – a group of interconnected low-cost computers that add together their resources.
• Enables working with multimedia – pictures, audio and video data.

• Supports handling XML documents in native format as well as in relational form.
• Enables working with geo data.
• Supports data consolidation and integration from various databases (Oracle databases as well as others) into one data storage or virtual integration – data from several databases and other sources (structured and non-structured data – XML documents and more than 100 other file types) remain on their locations but they seem like they are present in one database.
• Supports searching in various data sources – Oracle database, ODBC databases, IMAP mail servers, files etc.
• Embodies built-in Business Intelligence tools – ETL (Extract, Transform, and Load processes), Data Mining, and OLAP.
• Using SQL and XML technologies and procedural languages (PL/SQL, Java, C/C++ etc.) supports convenient database application development right above the data in the database.
• Supports using Business Rules in the database – they don't have to be implemented on the application level, one rule can be simply used in more situations.

MS SQL Server

SQL Sever database is designed exclusively for MS Windows operation systems. It is primarily focused on affordable price while offering functionality that belongs to standards on the market with database technologies. Its functions include:

- Automatic database performance tuning.
- Integration for various platforms, applications and devices.
- Enables storing XML in both native and relational forms.
- From the field of Business Intelligence it offers tools for ETL, OLAP, Data Warehousing and Data Mining.
- Using ETL tools information from more heterogeneous data sources can be accessed.
- Flexible system of privileges.
- Tools for fast database recovery after a failure, database mirroring etc. that increase database availability.
- Enables creating web applications by connecting data with http output.
- Supports full text searching.
- The implementation of Business Rules is reduced only to sending a message to a user in the case of defined situation.

DBD2 Universal Database

This database by IBM competes with Oracle for the leadership on the market with database servers. Presently, it is one of the best databases achieving excellent results in various tests. Some of its characteristics include:

- The database embodies tools ensuring high availability (e.g. tools related to system recovery after an outage).
- Tools for automatic database management and tuning.
- Works with XML documents in both native and relational format.
- Enables to access remote databases and other information sources.
- Enables working with geo data.
- Contains tools for fast full text searching.
- Embodies Business Intelligence tools – ETL, OLAP, and Data Mining.
- Works on many operation systems (AIX, HP, Linux, Solaris, and Windows).
- Facilitates applications creating by supporting many standard technologies.
- Contains tools for data integration across an organization based on open architecture.

Sybase

The Sybase database is available in three basic forms – for eBusiness (includes effective support for data types related to eBusiness, works with XML documents (searching in XML, generating XML documents), JAVA environment integrated directly into the database enables writing stored procedures or combining JAVA with SQL and thus accelerate database applications creation), for data warehouses and Business Intelligence (focuses on high speed of queries execution by taking advantage of patented technology Bit-Wise, data stored in compressed form significantly saves disk space, can be connected with some OLAP tools), and as a package SQL Anywhere Studio that contains database server (it belongs rather to smaller databases) and tools for creating reports, database management, internet technologies support and development tools.

Open-source databases – characteristics

Probably the most prevalent reason of using open-source databases (and other products) is their low (sometimes zero) acquisition price. In the contrast with sometimes very high price of commercial databases it can be significant factor. It is necessary to realize that the price of commercial database can also include installation, documentation, maintenance, user support etc. All these costs must be considered and calculated together with purchase price.

Another criterion that should be in the first place is the functionality of the database server. It is necessary to realize what purpose will be the database user for – what will be the data volumes, what will be the character of data, who will use the data, and what operations will be executed with the data.

Some open-source databases of course don't have (and cannot have) for their development such background (money, employees, experience) like the companies where commercial database are developed. That is why they often don't have such functionality and other possibilities that are necessary for the purpose of database acquisition. However, when an open-source database server meets all necessary criteria it can be considered as an alternative to a commercial database.

If a database server is a subject to some of open-source licenses it is possible to modify the source code. This is an advantage when a company has good programmers who can, when it is necessary, to adjust the application according individual requirements.

Another advantage is that open-source products are developed by big groups of volunteers forming large communities. Therefore, it is often very easy to get an advice regarding the problems that occur during database installation, operation, configuration etc. This information is usually free of charge.

PostgreSQL

This database has been developed at the University of California at Berkeley and later by the PostgreSQL Global Development Group for more than 15 years. It is very powerful database that offers possibilities that make it comparable to big commercial databases and that finds its place even in famous commercial companies.

Its characteristics include:
- PostgreSQL has many common characteristics with big commercial databases, e.g. transactions, nested queries, triggers, views, reference integrity checks and sophisticated locking mechanisms. It supports some features that some databases don't have – user defined data types, inheritance, rules, MVCC (Multiversion Concurrency Control) locking (the reader is not blocked by the writer).
- It supports many operating systems (Linux, AIX, BSD, HP-UX, SGI IRIX, Mac OS X, Solaris, SunOS, Tru64, BeOS, and Windows).
- It supports most of the data types defined by the SQL92 and SQL99 standards, large binary objects, multimedia etc.
- It contains SQL procedural extension using stored procedures written in Perl, Python, C, JAVA, and own PL/pgSQL.
- Enables defining own data types including related operators.
- Offers interfaces for a variety of programming languages.
- Embodies tools for query optimization.
- Enables storing huge amounts of data – unlimited database size, maximum table size 32 TB etc.
- Enables using the database for geographic information systems.
- Offers graphical interfaces for managing the database.
- High availability and scalability.

MySQL

MySQL has been the most favorite database server for web applications for many years. This is given by high speed of data retrieval. From new version 5.0 MySQL becomes a database that can be used in many other fields and is competitive with commercial databases.

Some of its features are in following list:
- MySQL database can be quickly and easily installed using a graphical wizard.
- High availability and scalability.
- Supports transactions.
- Enables definition of checking rules for inserted values also for multiple columns.
- Supports unlimited database size.
- Embodies tools for achieving high performance in the field of web applications and data warehousing.
- Supports stored procedures, functions, and triggers that facilitate definition of business rules on the database level.
- Enables execution of mathematical calculations with very high precision.
- Enables operation or more than one server including transaction processing.
- Includes a tool for compression of old data in the database. Some space can be saved while old data are still accessible (for reading).
- The possibility of communication with the database using C/C++, Delphi, ODBC, JDBC, OLEDB, and PHP Driver.

Firebird

It is a database with more than 20 years long tradition. It originates from the code released by the Borland Corporation and its features include:
- Procedural extension enables creating stored procedures and triggers.
- Stored procedures can be used also for creating views.
- Full transaction processing support.
- On-line backup during database operation.
- Database server can be extended by new functions created in various programming languages.
- The database size is limited only to disk capacity.
- Supports Linux, Windows, MacOS, Solaris, and HP-UX operating systems, can be easily ported among different platforms.

DISCUSSION

Commercial databases comparison

SAP Corporation made a test of various databases in cooperation with its ERP systems R/3 and mySAP ERP. The test was running on various computers with miscellaneous operation systems and different database versions. The highest speed expressed by the number of processed rows per hour was achieved by DB2 and Oracle databases, middle and lower places belonged to MS SQL, Oracle, DB2, and Informix databases (SAP, 2005a), (SAP, 2005b). Similar results were achieved with tests executed by the Transaction Processing Performance Council. This organization defines comparison tests for databases and transaction processing for providing objective information for third parties. From the point of view of marketing strategies, TPC-C (on-line data processing) and TPC-H (decision support) test can be considered. In both tests were among the first ten mostly Oracle and DB2 databases, less occurrence had MS SQL database. In the category performance/price were the best results

in TPC-C test achieved by MS SQL database. TPC-H test gives almost the same results like the performance tests. The fastest database in all three tests is DB2 database (IBM, 2005).

From the price perspective, the best perceived database is DB2. MS SQL Server 2005 seems also budget-priced but the license fee doesn't automatically include maintenance costs. For its price the same quality and scale of functions are also not available as in the case of Oracle and DB2 databases. Oracle database is perceived as the most expensive but the most flexible (it offers the biggest number of functions and possibilities). On the other hand, if the Oracle database runs on small number of CPU's and is intended for small number of users the price can be very friendly. The impact on the final price has also used operation system. MS SQL operates only on Windows operation system which increases its costs (Market Magic, 2005). The actual difference is also given by the fact what additional features are required (management tools, Business Intelligence tools, security tools etc.).

According Bloemen and Brunner (2000) the best results in the terms of the number of outages and the time needed for subsequent database operation were achieved by the DB2 database. DB2 together with Oracle also have a variety of tools for database management during planned outage. Oracle, DB2 and MS SQL are able to backup the data using a backup server (standby database), Oracle and DB2 make automatic redirection of requests to backup server. During the failover has the Oracle advantage in enabling immediate work with the data while the rollback is in progress. From the point of view of availability Oracle and DB2 are comparable According Bloemen and Brunner (2000) Oracle achieves a little bit better results), MS SQL doesn't reach their qualities. All three mentioned databases require different payments for backup servers – Oracle needs full license, MS SQL proportional part and DB2 license for one CPU or nothing (Park, Disbrow, Scott, 2005). However, according Otey and Otey (2005), all database systems (Oracle, DB2, MS SQL) are able to ensure sufficient availability.

All major databases support the most important standards from many fields, such as UNICODE, ODBC, XML, XPath, XML Schema, J2EE, NET, and LDAP. Particular implementation may be slightly different in various databases. MS SQL focuses mainly on standards that are related to Windows operation system.

Database systems DB2 and MS SQL use operation system functions for user authentication (DB2 generally supports any third party products, MS SQL cooperates with products that are designed for Windows). Oracle also offers possibilities of internal authentication and some kinds of network authentication. Oracle also, as the only database, provides the possibility of sending other information for authentication which is suitable particularly when a web application works with a database and all requests are encapsulated under one user (Bloemen, Brunner, 2000).

Permissions for working with the data are resolved on the level of users, groups, and eventually roles. DB2 and MS SQL support users and privileges, Oracle supports also roles (other that system roles). Oracle enables access management on the level of individual rows and not only on the level of database objects. Encrypted network communication channel is supported by all from Oracle, DB2 and MS SQL. Oracle and DB2 also support the encryption of data stored in the database (for individual columns), MS SQL is able to encrypt only user names and passwords.

XML support is present in all Oracle, DB2, and MS SQL. The simplest XML handling is offered by DB2 (Bloemen, Brunner, 2000). Oracle provides variety of tools that are rather complicated. MS SQL provides possibilities that are dependent on the Windows platform.

MS SQL server is generally considered as the easiest for installation, operation and management. Oracle and DB2 provide most possibilities during the configuration and more powerful instruments given by their procedural SQL extension. Oracle database provides the widest range of possibilities for procedural extension of SQL (Chigrik, 2000a; Chigrik, 2000b). The most complicated database for installation, configuration and operation is considered Oracle (Bloemen, Brunner, 2000). On the other hand, Oracle provides the widest range of management possibilities.

MS SQL database runs only on Windows operation system, Oracle and DB2 support also other platforms (Oracle can be installed on more platforms that DB2 but DB2 works on more types of computers). According Howard (2003), the approach of MS SQL can be considered as an advantage because some functions can be delegated to the operation system. Databases Oracle, DB2, and MS SQL support mobile connections to database from mobile computers or other mobile devices. However, MS SQL cooperates only with Windows operation system.

According Bloemen and Brunner (2000), Oracle and DB2 databases provide possibilities of connections to a wide variety of available database servers. DB2 supports the cooperation with most kinds of unstructured data types and enables also remote access. Oracle has the unstructured data stored in one directory which is a disadvantage in comparison to DB2. MS SQL connects to other databases using ODBC and OLE DB interfaces, non-relational data can be handled only using OLE DB drivers.

It the field of business Intelligence is the MS SQL database quite integrated and easy solution that is directly included in the database (Bloemen, Brunner, 2000). Oracle and DB2 provide BI tools as separated modules with extensive functionality and performance. In some fields Oracle surpasses DB2 database but at the cost of high complexity, difficulties with the operation and worse integration.

Open-source vs. commercial databases

Information systems usually don't support all available database systems. It is usual that well-established commercial databases are supported by most information systems, often in different versions. However, here also exist renowned commercial information systems that are able to work with open-source databases (e.g. SAP can cooperate with MySQL). Therefore, open-source databases can be an alternative to commercial databases in the architecture of an information system.

The main criterion that can play the major role in the selection of a database server can be its acquisition price. Open-source databases are usually free of charge, the costs are associated with the installation, training, loading the database with the data etc. On the other hand the price of commercial database is often dependent on many factors, such as the number of users, CPU's etc. so the price can be either very high or acceptable.

Specific way of pricing is used by MySQL database. The price depends on the purpose of application. If it is a component of a commercial product where there is no concern to publish the source code, it is the subject of commercial license including the support and warranties from the side of MySQL.

The price that must be paid for the commercial databases (or commercial license of an open-source database) can be balanced with the support for problems solving, providing the installation, training, documentation etc. If such services are required for open-source databases it is possible to buy them from a specialized external company. These are able to provide such services that make open-source databases competitive with the commercial ones.

The difference between commercial and open-source databases is usually in the functionality that is provided by individual databases and in their implementation. The functions that are usually supported by commercial databases, but not by all open-source databases, include creation of views, set operations,

nested queries, triggers, stored procedures and functions, data locking, various types of indexes, using technologies UNICODE, SSL, interfaces for programming languages, replications, complex privileges system etc.

Relatively significant difference between commercial and open-source databases is in the field of database backup where the commercial databases provide much more possibilities (Conrad, 2004).

CONCLUSION

Comparison of individual databases with a clear result is very difficult question. The reason is that all mentioned databases provide a wide variety of functions that don't necessarily have to be mutually comparable. Big influence has also particular application of the database for specific purposes and its configuration made by database administrators. Another contradiction is that when a database offers a lot of functions and/or many possibilities for configuration it may become very difficult to manage or even worse and slower than simpler databases.

It is possible to say that any of mentioned database systems can be used in information system for marketing strategies support. The final decision depends on particular company and its information needs and preferences.

For applications that require strong analytical capabilities demanded for decision support, DBD2 and Oracle databases seem to be the most suitable, especially for large corporations with huge amounts of data. However, for lower data volumes and simple queries MS SQL database can be sufficient together with affordable process.

In information systems that are dependent on smooth operation without outages, provide Oracle and DBD2 the best level of service. The same situation regards the security issues.

In large companies, where many applications, databases and other information resources are in use, strong commercial databases provide most advantageous solutions. In the case of DBD2 and Oracle databases is this solution independent on operation system.

In practice, databases Oracle (on UNIX systems) and MS SQL (on Windows systems) are usually used (see Dařena, 2005). This confirms the results of this paper that mentioned databases sufficiently support marketing planning process.

SOUHRN

Výběr databázového systému pro podporu marketingového plánování v informačních systémech

V dnešním dynamicky se měnícím prostředí má marketing velice významnou roli. Tvorba úspěšných marketingových strategií vyžaduje velké množství kvalitních informací různého typu a z různých zdrojů. Výkonný databázový systém je nezbytnou podmínkou pro možnost tvorby a realizace těchto strategií. Práce se zabývá činnostmi v oblasti strategického marketingového plánování a specifikuje oblasti, jež jsou pro činnosti z pohledu databázových systémů klíčové a měly by tedy být databázovými systémy nabízeny – jedná se o technologie Business Intelligence, prostředky pro datovou integraci a komunikaci, požadavky na bezpečnost a dostupnost, podpora transakcí a škálovatelnost. Z hlediska vyhovění těmto požadavkům jsou zkoumány hlavní komerční (Oracle, DB2, MS SQL a Sybase) a open-source (PostgreSQL, MySQL a Firebird) databázové systémy a je provedeno jejich srovnání. V úvahu jsou brány nejen nabízené funkce jednotlivých databází, ale také výsledky nezávislých testů prováděných např. firmami SAP Corporation či Transaction Processing Performance Council. Výsledky jsou použitelné pro návrh hardwarové architektury při rozhodování o konkrétním databázovém systému.

marketingová strategie, databázový systém, srovnání databází, Business Intelligence, datová integrace

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