APPLICATIONS FOR BUSINESSES THAT USES RELATIONAL DATABASES

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Abstract

The paper presents a database production model designed as a warehouse star that contain dimensions like deposits, raw materials, stocks, products, producer, locations, time and a fact table with foreign keys and measures. This model optimize the activity of a business based on a production activity in the way that it can store large amount of data in a historical way that can be the base for future scenarios with key values changed by the decision maker. The decision maker analyses a large spectrum of reports and choose what indicators to observe and what measures to display and so it's easy to decide based on large amount of data and trends. Database applications for business improve the efficiency in managing large quantity of data in the sense for storage, updates, queries, interaction with the users and also getting answers through reports. The schema specific to a database is very flexible and permits adding or removing columns and also adding and removing entities. This feature is very useful when the relational database schema is transformed in a data warehouse shaped as a star with dimensions and a fact table. This model permits advanced queries and the usage of rollup and drill down objects specific to the business intelligence tools that offer quick responses to the complex answers. To a production business the choice of a database application designed and implemented as data warehouse star model, bennefits from all the advantage of storage and also a superior and complex tool for building queries.

Keywords*: Database storage, business intelligence tools, business production model, data warehouse star model, SQL queries and reports, rollup and drill down objects.*
JEL Classification*:* C23, C26, C38, C55, C81, C87

1. Introduction

A database application for a production business envolves storage of a large amount of data and the management of entities like products, stocks, raw material, deposits, producers and locations. This model also permits the interaction with the users and allow to the decision makers to build complex queries and reports that respond to a various questions. The architecture of a system aimed at its components and how they interact, types and operations allocated to each component. For an interactive decision support system architecture includes the following subsystems: data management subsystem, management subsystem models and sub-dialog user. Data management subsystem consists of the following elements: database management system database oxidase, data dictionary and declarative query language.

The database is built to meet the information requirements of the system and data is a collection of interrelated operated by one or more users in one or more applications. The database is no internal data, external data and personal data [1], [5].

Internal data from the current activities of the organization and operations of the various functional departments image. Data external economic information circulated nationally and internationally and usually come from the industrial sector of which the company, the legal regulations. Personal data is data that relates to the behavioral aspects of decision-makers in making decisions. Whatever their nature, data is stored in relational databases (transactional system data) or data warehouse, built on subjects of interest. In current systems, the company's intranet, are increasingly present data accessible through web browsers and multimedia objects, such as maps, images, sounds.

The data source, internal or external, data is extracted and managed by a management system database. The management of the database depends on the data organization. In most cases there is a system SGBS transactional relational data management system and a database for multidimensional data warehouses created. The data dictionary is a catalog of all the data in the database. It contains data definitions, data sources and their intrinsic significance. The data dictionary operations are allowed to add new data, deletion or retrieval of existing information according to certain criteria. Most often the data dictionary used in the first phase of decision-making, data mining to identify their problems and opportunities. Declarative query language offer data interrogation facilities. The SQL language is used, which accepts requests for data from other systems [2], [4].

2. The specification of data storage in databases managed by the DBMS's

Subsystem management model consists of the following components: base models, the management models, dictionary models and processor execution and integration patterns

Base models kit contains models that enable analysis of the facts and the solution choice under the conditions required by the user. It is the component that differentiates interactive decision support systems from other systems. The models are domain-specific (financial, statistical, forecasting) models and can be classified into strategic, tactical and operational models models. The models assist strategic decision-maker in developing the overall strategy of the firm, on the development issues of corporate objectives, choice of location of the equipment; analyze the impact of environment on activity of the organization.

Tactical models are applied to the organizational subsystems and assist the user in taking deciziilorprivind allocation and management of resources of the subsystem, planning model for promoting products. The models are used currently operational and transactional system aims of the organization, credit approval of a plan of production, quality control.

Base management system allows creating new models models using programming languages, update and modify existing models, establish interdependencies between models. Manage in a logical manner a variety of models to consistency of the data model and provides integration of system information components in the application [3], [6].

The dictionary is a catalog of all models modelelelor containing the definitions used, the main functions of their scopes. The processor execution and integration of models must be viewed through the prism functions performed by him, thus:

- Processors execution models interpret instructions received from the user and sends management system models; check the conduct of the programs that are built models.
- Combines processor integration operations in several models depending on the requirements of decision making and decision support system integrates other applications.

The subsystem contains a dialog with the user management system user interface and a processor that takes inputs through outputs and provides command languages through language presentation. It is the only system component with which the user works directly.

Defining an effective interface should consider choosing devices Input / Output, design screens, the format of the data and information. Generators interactive decision support systems provide multiple interface styles: menu-driven interaction design, question-answer style, dialogue

based on natural language processing, graphical user interface. Choice is an option team decision and depends on the method that ensures information management; the real complexity of the system will be implemented.

Decision support requires a permanent dialogue with the user, so that the interface has a much greater importance than other systems. The user, person or group of persons through the role they play in making the decision, is considered part of the system. It is involved in all phases. Studying the specific context, correctly defining the problem and lead to choosing an alternative from a set of possible solutions. Quality and efficiency of decision depends on how they react in the context of decision-making, how the adopted solutions [2], [4].

Managers or specialists in various professional fields, expects the system conclusions or details. It is working in teams constituted for a period of time, according to some temporary tasks. In complex situations there are analysts arrange the connections with managers that use the decision support systems, being the persons who have knowledge about managerial problems, but experience in decision support technologies. Harmonization with the environment in which they work, transferring responsibility to lower levels, seeks the participation of all the success of the business.

Communication between managers and other employees, communicating with other sources of information is achieved precisely by this component dialog. And so, interactive decision support systems are no longer used only for planning, organization and coordination but also for inter-personal communication, establishment and execution of daily tasks.

The functionality of these systems relies on the use of data stored in the database. Existing data are organized, coordinated, integrated and stored to give the user a complete view of reality.

Operational data, subject of daily transactions are stored in relational databases. Management systems using relational databases, data are processed to obtain information.

Synthesis, analysis and interpretation of data are necessary to support decisions involving merging, categorizing, grouping data correlation and existing in accordance with its intended purpose. Synthesis is a process intermediate turn data into information, a process by which data is centralized by certain criteria.

The analysis highlights the relationship to structures, causal and functional between data synthesized. The simplest form of analysis is comparing the data with similar data synthesized. In addition, information can acquire quality when using techniques of graphical representation that makes these correlations, observation techniques analytical data based on mathematical theories, comparing actual data with the theoretical products of a hypothetical model or observation techniques automatic based on data.

Interpretation follows the descriptive power of the model. Calls on knowledge of general and specific fundamental associated with the domain and existing expertise [1], [3].

Systems architecture components of interactive data-driven decision support, the most important is the data management subsystem. Data from internal and external sources make up an analytical database, which contains analytical indicators which reflect the performance of the analyzed system, which allows evaluation of the system analyzed in a multidimensional manner. By performing a diverse set of operations on transactional data, custom views are provided to the user on the stored data.

Decision support systems are a natural progression from reporting information systems transaction processing systems. These systems are interactive, accounting information systems, ICT-using decision models and specialized databases to assist managers in decision-making processes. Thus, they are different from transaction processing systems, which focuses on the processing of transactions and data generated by business. They also differ from information reporting systems that focus on providing pre-specified reports for managers, reports that help for making complex decisions.

Instead, decision support systems provide managers information in an interactive session or in an ad hoc way. Such a system provides analytical modeling, data retrieval systems and information presentation capabilities that allow managers to generate the information needed to make decisions in an interactive computerized. For example, spreadsheet applications allow a manager to receive interactive responses to ad hoc requests for sales or profit forecasts formulated within analitice1 models.

The answers differ from those pre-specified information reporting systems.

When using a decision support system, managers investigates experimental alternatives and receives information based on a set of alternative assumptions. Thus, policymakers should not specify a priori information requirements, the system interactively assisting them to find the information they need.

System information executive management systems are built on strategic management information needs. Managers procure the necessary information from several sources, including letters, notes, journals and reports made manually or through computer systems, in meetings, telephone conversations and social activities. The main purpose of information systems is to provide executive decision makers of the organization that provides strategic management quick and easy access to information about critical factors in achieving the strategic objectives. Such schemes involve the use of graphic representations and fast access to content databases for information about the current status and trends of components designed. A

database containing all the necessary information about objects involved in a lot of applications, logical relations between this information and the proper processing techniques. Databases and integration of data occurs, meaning that many files are taken together, eliminating redundant possible that information. It also allowed simultaneous access to the same data, which are found in the same place or are, distributed spatially more persons of different preparations, each with personal working style [2], [6].

When analyzing the information needs of an organization, we have mainly focused on the identification of entities, attributes and relationships.

We can look at an entity as a separate object such as a person, a department, a concept or event that belongs to an organization to be represented in the database. The attribute is a property that describes some aspect of the object that we want to record and the relationship refers to an association between various entities. Thus we can say that the database contains entities, attributes, and relationships that are logical linked.

Depending on what is highlighted graphically, use two types of architectures:

- Component architecture - offers an insight into the elements that form a system database, but also the inter-dependencies between them.

Specific components of the architecture components are:

- data - are organized in a database, comprising:
  - Databases themselves;
  - Dictionary data (data structure, integrity constraints, views, etc.);
  - Attachments, as the index.
- software - is for the establishment and operation of the database and contains:
  - System and database;
  - Application programs developed for the most part, a management system databases.

- Auxiliaries - are components contributing to the functioning of the entire system and database:

- a set of automatic procedures (routines) and manuals;
- legal and administrative regulations;
- hardware means used;
- persons involved in the categories of users;

Architecture tiered structure database system on three levels and offers an insight into the organization and its functioning.

- Conceptual level - is given by the database administrator vision on the data. Related to this level, we can mention the following:
- administrator performed the conceptual structure of the database, possibly using the tools provided by a DBMS;

- conceptual structure is obtained using a specific data model for the database, and a design technique as appropriate;
- conceptual structure within the system is a representation of reality that database transcribed;
- vision of the database administrator is independent of applications to be developed (logical independence);
- conceptual level is the result of conceptual schema;
- realization of the scheme corresponds to a modeling activities because it is a transposition in abstract terms of real world entities;
- once defined conceptual schema must be confronted with the real world for identifying and resolving inconsistencies or omissions; because of its comprehensive, unitary, it is recommended that the conceptual scheme to be managed by a single person;

The logic is given by the programmer's view of the data. Related to this level may present the following:

- scheduler performs application programs for describing and manipulating data written in a DBMS;
- implements programs external structure (logic) data;
- external structure is derived from the conceptual structure;
- external structure of the vision of the database programmer for a particular application;
- vision programmer is independent of technical support information (physical independence);
- logical level is the result of external schema as part of the conceptual scheme, implemented using a DBMS;

The physical level - is given the vision of the analyst, engineer, and system on the data and is intended to describe how the data are stored in the database. Related physical level we can mention the following:

- system analyst whose responsibility it is to achieve internal structure (physical);
- internal structure is inferred from external according to techniques and methods for allocation on a physical medium;
- described the internal structure of information data on physical media;
- physical Layer is the result of internal diagram (physical) which is defined in terms of files and records;
- scheme implementation is done using internal file management system within the DBMS's and / or operating system, the management of physical peripherals;

3. Developing an informatics system based on a relational database for production designed as a data warehouse

The process of building a data warehouse envolves the analysis of data. Extract information in order to obtain information for decision making. Basically there are two steps: designing and populating data. Design is the stage where the data warehouse model is chosen, depending on the complexity of the system real user requirements and data structure existing in the company such as databases, Excel spreadsheets and so on [3], [5].

Building a data warehouse there are three models: type star, snowflake patterns type and constellation type models. Conceptual models are multidimensional and designed to organize data necessary decision-making process on issues. The models may change depending on the context, presenting the data in a structure bed, easily designed and accessible to end users.

In such a model is highlighted:

- quantitative data centralized called measures of activity
- quantitative criteria for centralized aggregation, referred sizes
- relational table that stores the measures identified by the facts dimensions is called table
- Tables where aggregation criteria has explicit codes, called type tables list. Facts associated table.

The star is the type of aggregation criteria when codes are explained in type tables list. Using data from lists, star type structure enables higher levels of aggregation on the initial size [4], [6].

Data warehouse star

The eastern type constellation when several schemes that use the same type star catalogs. The advantage is that the same warehouse can store different facts that have certain common coordinates and therefore share the same lists.

Deposit constellation

The type is snowflake if any alternative classifications for the same code by integrating undersize and alternative dimensions. To analyze the evolution of the value of Supplies Company based on several criteria required of users, you can define a data warehouse type star.

In figure 1 is described a star warehouse model for production:

In such a model the dimensions have a corresponding key in the fact tables (ex. Id_producer – primary key from Producers has a corresponding key in Fact production – foreign key). This model permits to create complex query by simply choose the attributes from dimensions and a measure from the fact table. It also is possible to create graphics based on queries that contain attributes from dimension tables and measures from the fact table.

Inserting data into dimensions can be made through an insert SQL command:

```
INSERT INTO PRODUCERS (ID_PRODUCER, PRODUCER_NAME,
PRODUCER_TYPE, PRODUCER_DETAILS, PRODUCER_RATE) VALUES (1,
'PRODUCER 1', 'TYPE 1', 'DETAIL 1', 5);
```

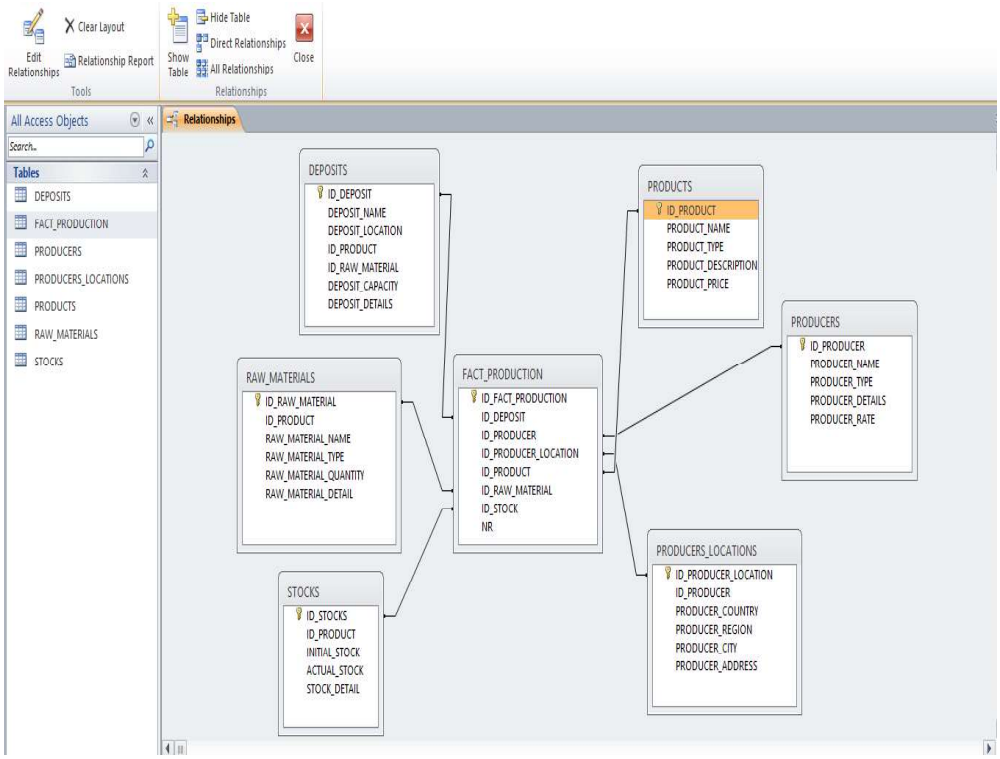

Figure 1 – A star warehouse model for production

Inserting data into the fact table is made also through an insert SQL command based on a trigger fired when inserted data into dimensions is:

```
INSERT INTO FACT_PRODUCTION (ID_FACT_PRODUCTION, ID_DEPOSIT,
ID_PRODUCER, ID_PRODUCER_LOCATION, ID_PRODUCT, ID_RAW_MATERIAL,
ID_STOCK, NR) VALUES (1, 1, 4, 5, 3, 1, 2, 1);
```

Creating a query into a star model warehouse:

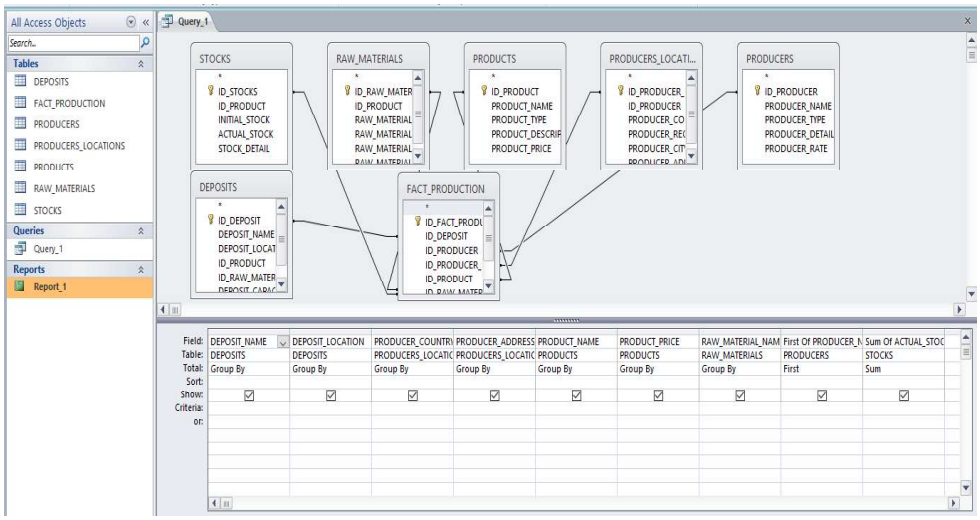

Figure 2 – Building a query in a star warehouse model for production

The query code:

```
SELECT DISTINCTROW DEPOSITS.DEPOSIT_NAME,
DEPOSITS.DEPOSIT_LOCATION,
PRODUCERS_LOCATIONS.PRODUCER_COUNTRY,
PRODUCERS_LOCATIONS.PRODUCER_ADDRESS, PRODUCTS.PRODUCT_NAME,
PRODUCTS.PRODUCT_PRICE, RAW_MATERIALS.RAW_MATERIAL_NAME,
First(PRODUCERS.PRODUCER_NAME) AS [First Of PRODUCER_NAME],
Sum(STOCKS.ACTUAL_STOCK) AS [Sum Of ACTUAL_STOCK]
FROM STOCKS INNER JOIN (RAW_MATERIALS INNER JOIN (PRODUCTS INNER
JOIN (PRODUCERS_LOCATIONS INNER JOIN (PRODUCERS INNER JOIN
(DEPOSITS INNER JOIN FACT_PRODUCTION ON DEPOSITS.[ID_DEPOSIT] =
FACT_PRODUCTION.[ID_DEPOSIT]) ON PRODUCERS.[ID_PRODUCER] =
FACT_PRODUCTION.[ID_PRODUCER]) ON
PRODUCERS_LOCATIONS.[ID_PRODUCER_LOCATION] =
FACT_PRODUCTION.[ID_PRODUCER_LOCATION]) ON
PRODUCTS.[ID_PRODUCT] = FACT_PRODUCTION.[ID_PRODUCT]) ON
RAW_MATERIALS.[ID_RAW_MATERIAL] =
FACT_PRODUCTION.[ID_RAW_MATERIAL]) ON STOCKS.[ID_STOCKS] =
FACT_PRODUCTION.[ID_STOCK]
GROUP BY DEPOSITS.DEPOSIT_NAME, DEPOSITS.DEPOSIT_LOCATION,
PRODUCERS_LOCATIONS.PRODUCER_COUNTRY,
PRODUCERS_LOCATIONS.PRODUCER_ADDRESS, PRODUCTS.PRODUCT_NAME,
PRODUCTS.PRODUCT_PRICE, RAW_MATERIALS.RAW_MATERIAL_NAME;
```

Based on the queries it can be built reports that helps the decision makers to choose what direction should have their actions. An example of a report based on the query above is represented in the image bellow:

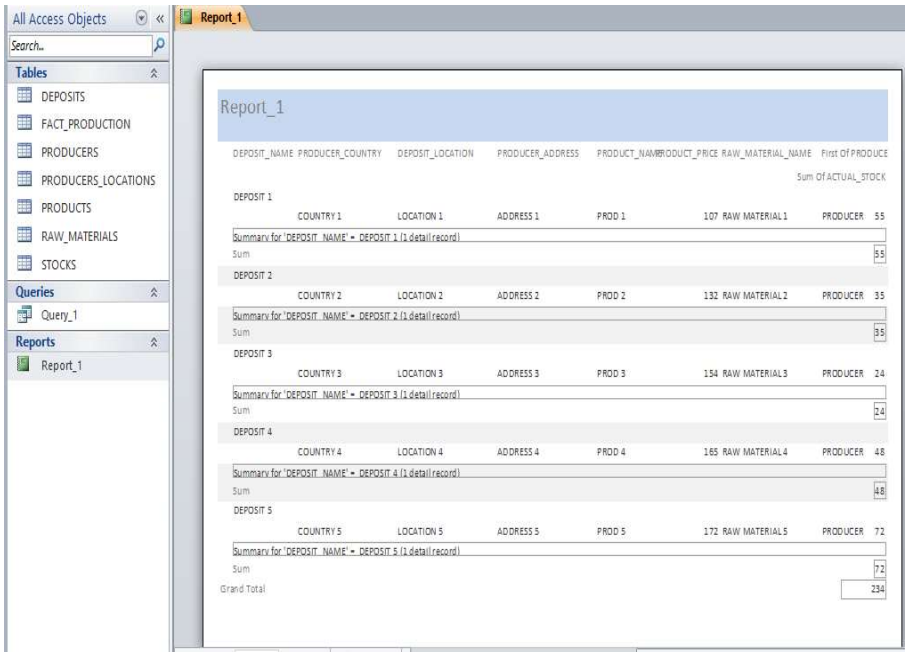

Figure 3 – A report based on a query in a star warehouse model for production

This kind of warehouse for production can improves orders and the stocks are always suplied with raw material. The responsible person with supply can choose what column should appear in the report and see what suplier has the raw material he needs for production. This flexibility is offered by the business intelligence tools in obtaining various results and create many types of reports for choosing the proper solution [4], [6].

Conclusions

Using databases for information systems that apply to businesses environments has advantages in managing production, financial, accounting and provisioning subsystems. Having data stored in a history of time in a database helps to build scenarious based on the knowledge accumulated and allows the decidents to avoid blocking and bad management based on previous experiences [1], [3]. The SQL language permits to query hystorical data in different periods of time that are useful in building future strategies in which the supply chain is not interrupted and hasn't dysfunctionality. An

information system for production has an physical architecture that mirrors all the main components, from raw materials to products and also has an interaction layer that may possible to evaluate an before situation and also to build scenarious that make possible future production that indicate the growth. A star warehouse model for production is flexible at the physical level in the sense that offer the posibility to add new dimensions or new measures and at the presentation level permits to build numerous reports that can reflect different scenarious by simply changing some key values an give other perspectives to the decision maker [2], [5]. This type of information system is interoperable with other system for financial, sales, accounting, marketing and management, and so it has inputs from other external environments, such as other companies that provide raw materials and offer outputs for the internal structures of an company such as sales or to the external markets and other companies that are competitive in the business environment.

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