

Different Kinds of Prototyping and Generator Tools to Develop Analytics Information System

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Abstract---*Analytical tools and datamining tools can be used intended to learn the characteristics of the database that is owned, including also looking for data requirements that will later be used as a basis for building information systems that have analytical features such as: decision support systems or executive information systems. In this case, the use of analytical tools is included in the 'observation stage' in the first stage of system life cycle, which is to use analytical tools for exploration, before actually modeling the system. OLAP tools can be used as prototypes for analyst systems and also for users so users can see before the system with analytic features is created. This paper explains how to use the tool in uncovering findings on data that will be used as a basis for building systems that have analytical features such as Executive Information Systems, Decision Support Systems or Expert Systems.*

Keywords---*Architecture, Software engineering, Information system, Method, Model*

I. INTRODUCTION

The analytical tool enables system analyst to analyze data for the purpose of studying data which later becomes a reference in building information systems. Generally analytical tools are used as a means of exploration in creating systems that have analytical features and expertise capabilities, such as: Expert Systems, Executive Information Systems or Decision Support Systems. Some examples of analytical tools that are often found are Online Analytical Processing (OLAP) and data mining tools. It is important to understand, that the use of analytical tools is carried out in the first phase of the design

II. OLAP COMPONENT

In this case, the OLAP Tool is only an observation tool that is used to study the characteristics of data and findings that might appear in relation to the data. Understanding of the characteristics and findings of data, will later be taken into consideration in making a system that has analytical features.

In order to understand how to explore data, the first components needed to run OLAP will be introduced, as described bellow:

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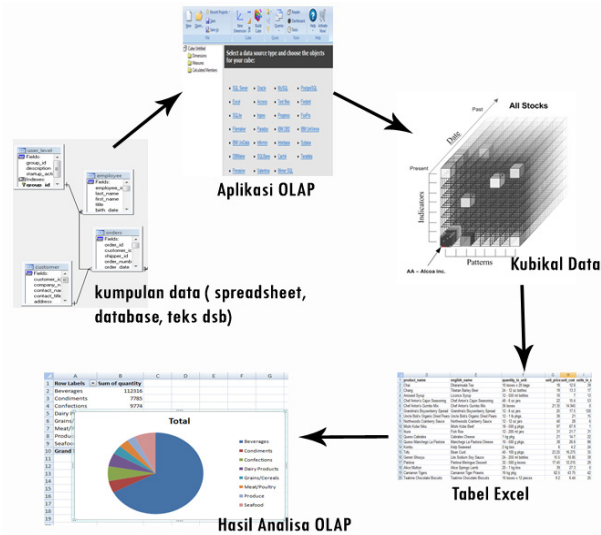


Figure 1: Data processing cycle with OLAP

Unlike just a simple single table, other components are needed to build OLAP, including:

- Collection of tables (tables: a collection of rows and columns).
- Relationship: connection between one table and another table.

Single table consists of rows and columns or known as two dimensional data, while data analyzed using OLAP features generally consists of many interrelated tables that form multidimensional data.

Before analyzing data with OLAP, data must be organized first in tables. Next, create a relationship that connects one table to another table. For example, 'Table of Sold Goods' which is related to 'Merchandise Master Table'. Information for analytic tools is generally sourced from many databases and many tables, therefore OLAP is able to create data dimensions created from correlations of various kinds of tables. Multidimensional data representations are shown in cubical formations. To form multi-dimensional data, many tables are related to each other, this is important in building the completeness of information.

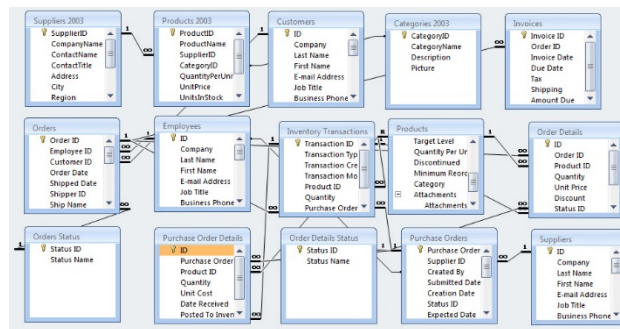


Figure 2: Multi-dimensional data - a collection of related tables

By building OLAP, the organized data in tables can be empowered for analysis purposes. Value information is not found if you rely on a single table that only organizes rows and columns. But with the OLAP application, other valuable findings will be revealed. Look at the picture below, the OLAP application reveals that sales of netbook products are not affected by the existence of 'certain brands' but instead have an impact on laptop and PC desktop products. Two dimensions are used as the basis of analysis, which consider:

- Types of computer devices (including: Desktop, Laptop, Netbook) and Brand of computer devices (among others: brand A, brand B and Brand C).

- Measure: Measurement of many sold products selected based on: type and brand
- Calculation: The value of the product is sold for the type and brand, in the form of values (in boxes) that make up the cubical object.

The form of virtual representation of cubical data is obtained after applying OLAP so that it can be seen based on what valuable values it wants to find. The findings of this data are outlined in the following table. Note: Tables are obtained after the OLAP application analyzes virtual cubical data built with a collection of tables.

In addition to requiring data that relies on other tables, multidimensional data has its own attributes to be managed in OLAP.

Three attributes are:

- Dimensions: attributes that are reviewed.
- Measurement: a measurable quantity refers to the slices between the dimensions reviewed.
- Calculations (measurement results): results of measurement of a measurement (measurement).

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II.I. Applicable OLAP

To try to analyze data with OLAP, one application that can be used is OLAP Cube. The OLAP Cube application is able to create reports quickly and easily. This convenience is because Olap Cube can build cubical data on computers locally without server access. The OLAP operating technique on OLAP Cube is done with an intermediary graphic feature, just by clicking and dragging the mouse, without programming techniques.

In OLAP Cube, the results of the formation of cubical data are stored in a * .CUB file format that can be used and modified later.

Some of the advantages and features of OLAP Cube:

- Does not require an expensive server.
- Does not require SQL Server and additional OLAP devices.
- Other software support and compatibility for example: substituted with: Olap Cube Reader to access and display data; Olap Cube dashboard for sharing online.
- Able to handle a variety of data such as: SQL Server, Oracle, IBM DB2, MySQL, Sybase, Informix, PostgreSQL, IBM UniVerse, IBM UniData, Progress, Firebird, Interbase, Paradox, Ingres, Mimer SQL, Pervasive, SQLBase, Caché, Teradata, DBMaker, Valentina, Excel, Access, Text files, Visual FoxPro, SQLite, Filemaker.

The stages of using OLAP Cube in analyzing data are relatively easy, along with the steps:

1. Connect OLAP Cube to the data source or datasource to be analyzed.
2. Add the required table from the datasource.
3. Build Relationships between Tables.
4. Drag and drop the mouse for the field or column in the table in determining the 'dimension' and 'measure'.
5. Build cubes.

Any data can be used as long as it has an ODBC Driver (middleware for the database so that the database can be recognized by a different system) that is suitable for the database so OLAP Cube can recognize the data.

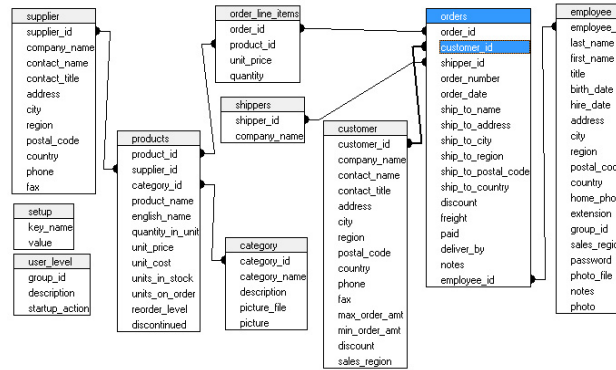


Figure 3: Example of Build Relationships between Tables

The steps to determine dimensions and measurements are very critical and this is the consideration of the data components that will be used in building information systems that have analytical features. It is done by selecting dimensions, for example selecting fields that will be used as the first dimension, for example the field category_name in the category table, also setting Measure to determine the measured field.

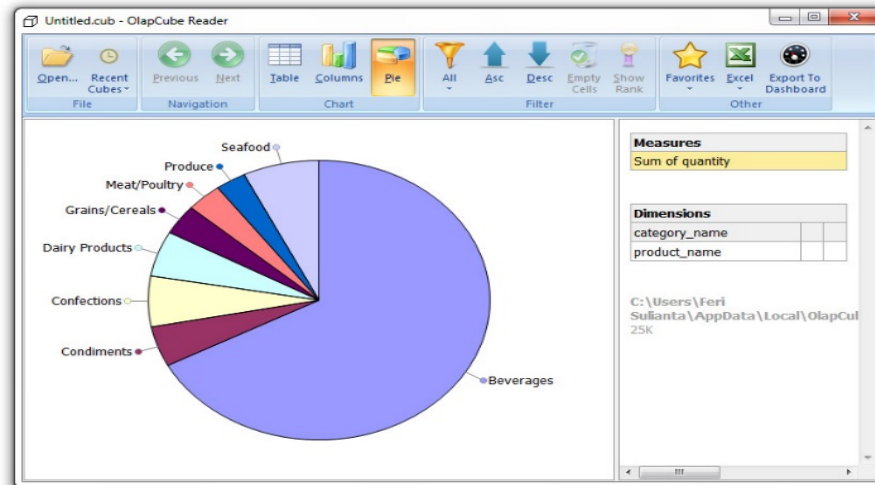


Figure 4: Cubical data has been formed and displayed on OLAPCube Reader automatically

Cubical data from the analysis shows: information on the number of products ordered and classified per category, such as beverage (beverage), seafood (seafood products), etc. It can be seen in the diagram that the beverage has a high order level compared to other products.

Reasoning with OLAP enables the system analyst to build a good and targeted analytical system in relation to the company's database conditions.

III. DATA MINING ANALYTICAL TOOL

The other data analytic tool is a data mining tool. Data mining is widely used by companies in building information systems that have a strategic role.

A popular example of data mining implementation is the findings obtained in the consumer shopping basket WALMART, an international caliber retail company. Very interesting, in the shopping basket it was found that consumers who buy diapers (English: diaper) apparently bought beer too (English: beer). Besides being interesting, this finding is also unique.

This behavior becomes a conversation and legend, because it is concluded that when a man is married and has children, they can no longer be free to travel like single men in general. Even so, the habit of drinking beer does not have to be done in public places such as in entertainment venues and the like, they can buy beer anywhere and drink it in their homes. Because this routine is routine, then besides they buy diapers for one reason they also buy beer which is both their pleasure and their habits. This is the behavior finding from the contents of the shopping basket.

In this case, a business strategy made by placing beer products next to diaper products at supermarkets is able to increase the purchase of both goods.

Such models are explosives found in data mining which are then used as a basis for looking for interesting data patterns that can be expressed by executive level managers when they use executive information systems or similar systems that have strategic roles.

The analysis process for building patterns is very simple, even though computational practices that occur in them are very complex. One of the Tools, open source, namely WEKA is able to wrap complexity and bring convenience before actually designing the actual system. In this case you just have to experiment and make observations, without having to directly build an information system. Consider the steps to use WEKA's data mining tool in producing valuable information in the data set as follows:

The process of conversion and data treatment needs to be done so that data can be read perfectly by data mining tools. Usually data is taken and separated from the transaction processing system or taken in the data warehouse

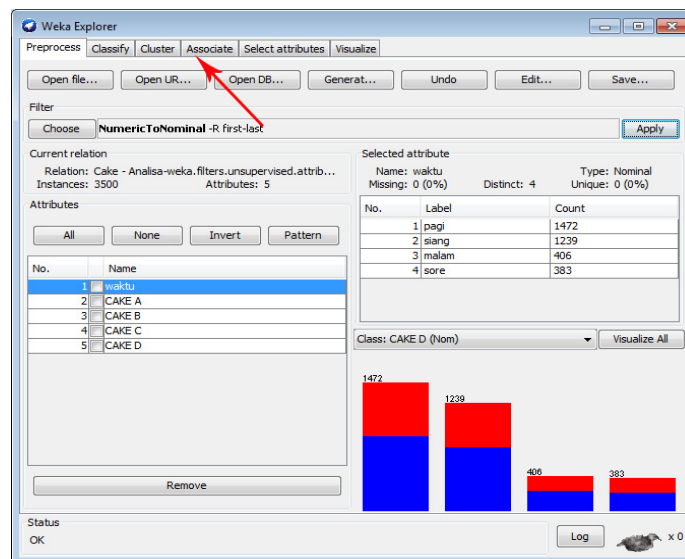


Figure 5: The Mining data tool provides a large selection of algorithms

There are several choices of algorithms that can be used to find unique patterns of data, each algorithm has its own advantages with a search mode that is different from one another. This is the advantage of a data mining tool. System Analysts can experiment first with a variety of algorithms.

For example, learning patterns for data is done using a priori predictive algorithm to produce the 'best association rules'. In a relatively short period of time that is directly proportional to the ability of the computer to process data, the WEKA Tool will present all the best findings obtained, for example, there are ten best association rules that can be applied to business. One example of the first association rule produced: 1. CAKE A = 1 CAKE B = 1 CAKE C = 0 214 ==> CAKE D = 0 214 acc: (0.99476). Cake A and Cake B events were bought while Cake C and Cake D did not, had a strong pattern with 214 transactions. The level of accuracy achieved occupies a value of 0.99476.

From this one of the business strategies that can be used is: selling products A and B and placed side by side, this makes it easy for consumers to take the products they like. In addition, various promotional strategies can be done

by selling two packages of these products cheaper or even increasing the availability of these two products. These considerations are made with business understanding and understanding of the products.

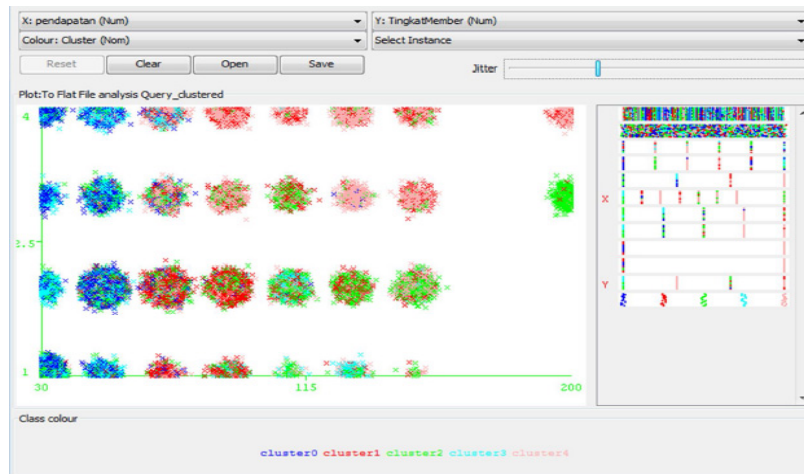


Figure 6: The Data Mining Tool has rich visual features in representing data patterns

If observation and analysis of data and information system solutions are met with data mining tools (* can be said to be prototyping tools), then the development of information systems can be done referring to desired features and findings in data mining tools.

IV MODELING STRATEGIC SYSTEMS WITH TOOL GENERATORS

Many other prototyping tools can be used such as Microsoft Excel spreadsheet applications that are powered by macros and Visual Basic Application. The ability of a spreadsheet application is more powerful with its development:

- Specific analytical functions, for example in calculating the Internal rate of return (IRR) or net present value (NPV), which is generally used in scientific accounting and management. Some financial functions that exist in Microsoft Excel are: NPV, IRR, FV, PV, MIRR, PMT, RATE, NPER, IPMT, PPMT
- What-if-Analysis: Model the conditions of 'if-then' to make a decision.

Such capabilities make today's spreadsheet applications used as prototyping tools, where analytical processes are modeled first in spreadsheets and if agreed upon, analysts and programmers will build the actual information system.

Generally electronic spreadsheets such as Microsoft Excel are often the prototyping model for business decision support systems (explained in chapter 2 about: Specifics, Generators and Tools), as exemplified as follows:

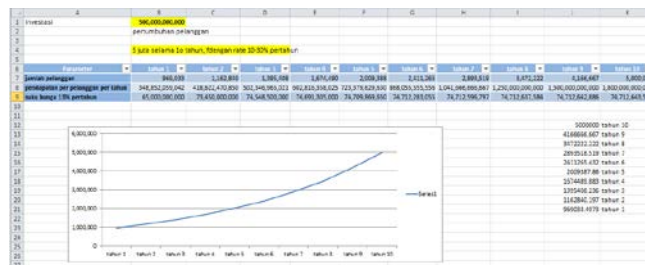


Figure 7: The spreadsheet application is able to create

The screenshot shows a spreadsheet with columns labeled A through K and rows containing various numerical data points. The data appears to be organized into sections, possibly representing different business units or time periods. The values range from small integers to large numbers with decimal places, such as 1.284.880 and 1.284.880.543.

Figure 8: The spreadsheet application features specific mathematical and statistical functions to calculate new business opportunities

The screenshot displays a worksheet titled "Exercise 7 : Net Present Value & Internal Rate of Return". It contains two questions and their corresponding answers. The first question asks for the net present value of an investment with a 14% discount rate. The answer shows a table with values for Year 1 to Year 5, including NPV (5,576.72), IRR (16.82%), and MIRR (15.77%). The second question asks for the NPV of an investment starting at year 0. The answer shows a table with values for Year 0 to Year 4, including NPV (6,357.46) and IRR (16.82%).

Figure 9: The spreadsheet application simulates a return on profits in the Internal rate of return or net present value

OLAP tools, data mining tools, electronic spreadsheets and tools with other analytical capabilities can be used to study the characteristics of the database, including searching for data requirements that will later be used as a basis for building information systems that have analytical features such as: decision support systems or information systems executive.

V. CONCLUSION

Basically the information system design is a very fundamental stage for the long-term information system. The architecture of the information system become a reference in developing and building a new information system if the system was walking was not again effective in supporting the activities of organizations or companies.

As well as to make information systems that have analytical features, need to be done exploration as a response to the needs of analytical systems.

Based on a comparison and literature study, some of the tools that can be used in doing observation experimenting began analytic tools, yakni: tool and various various olap, data mining tool and tool generator.

VI. ACKNOWLEDGMENT

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