Decision Support System for Personnel Information Using Data Warehouse

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Abstract——**In the area of information and communication technology, a wide variety of methods and tools are used for storing, processing and analyzing data. This paper is one in a series describing reference configuration and sizing information for Access data warehouses for small, medium, large solutions to meet business data warehouse needs. The system can be used by managers and end-users to understand the business and make decisions. This system attempts to study OLAP queries which are in terms of a multidimensional data mode. According to the respective roles and privileges, OLAP queries can be retrieved from the data warehouse. The system analyses personnel data for technological universities in Myanmar. This system is implemented by using J Builder 9 language and Microsoft Access.**

Keywords- Data warehouse, Star schema, and OLAP;

I. INTRODUCTION

Data mining process is efficient only the presence of summarized data that is stored in data warehouse [10]. A data warehouse is a semantically consistent data store that serves as a physical implementation of decision support data model and stores information on which an enterprise needs to make strategic decisions. An online analytical processing (OLAP) system manages large amounts of historical data [1].

Organization's decision making requires a comprehensive view of all aspects of enterprise and many organizations have therefore created consolidated data warehouses that contain data drawn from several databases maintained by different business unit; together with historical and summary information. Organizations need to turn their archives of data into a source of knowledge, so that a single consolidated view of the organization's data is presented to the user.

Data Warehouse is a "subject-oriented, integrated, time-variant and non-volatile collection of data that is used primarily in organizational decision making." Typically, the data warehouse is maintained separately from the organization's operational databases. [9].

This paper is organized as follows. Section 2 is introduced the related work of supervised learning. In section 3, we discuss the background theory. Section 4 is represented the system design. The implementation results of the system are described in section 5. Section 6 is presented the conclusion.

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II. RELATED WORK

E.F. Codd [2] presented Online Analytical Processing (OLAP) based on a dimensional view of data is being used increasingly for the purpose of analyzing very large amounts of data. Widom [10] presented a general research problem in data warehouses. The database community is devoting attention to the research themes concerning data warehouses.

Squire [8] presented the data warehousing is a promising technique for retrieval and integration of data from distributed, autonomous and possibly heterogeneous information sources. Data warehouses integrate data from multiple heterogeneous information sources and transform them into a multidimensional representation for decision support applications.

Inmon [3] has been presented a data warehouse is a repository of integrated information, available for querying and modified, the information is extracted from its source, translated into a common model, and integrated with existing data at the warehouse. Kimball [5] presented a data warehouse is a database that stores information oriented to satisfy decision making requests. The features of data warehouses cause the ones for OLTP's systems. Matrotta [7] presented a set of schema transformation primitives for relational data warehouse design.

III. BACKGROUND THEORY

Data warehouse (DW) is a relational database that is designed for query and analysis rather than for transaction processing. They support information processing by providing a solid platform of consolidated historical data for analysis [4].

Star schema contains a large central table (fact table) and dimension tables. The fact table contains the names of facts, or measures as well as keys to each of related dimension tables [6].

The Online Analytical Processing (OLAP) operates on historical data in both summarized and detailed forms. OLAP system provides facilities for decision makers to access and analyze the data in the data warehouses.

3.1 Data Warehouse Architecture

Fig. 1 shows a typical data warehousing architecture. It includes tools for extracting data from multiple operational databases and external sources; for transforming and

integrating data; for loading data into data warehouse and for periodically refreshing the warehouse [8].

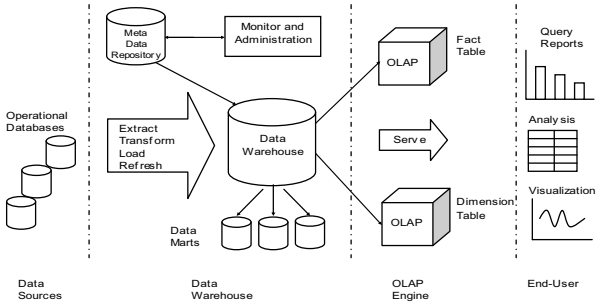

Figure 1. Data Warehousing Architecture

In addition to the main warehouse, there may be several departmental data marts. Data in the warehouse and data marts are stored and managed by one or more warehouses, which present multidimensional view of data to a variety of front end tools: query tools, report writes, analysis tools, and data mining tools. Finally, there is a repository for storing and managing metadata, and tools for monitoring and administering the warehouse system.

3.2. *Star Schema*

In the star schema, each dimension is represented by only one table and each table contains a set of attributes. Fig. 2 shows star schema of this system.

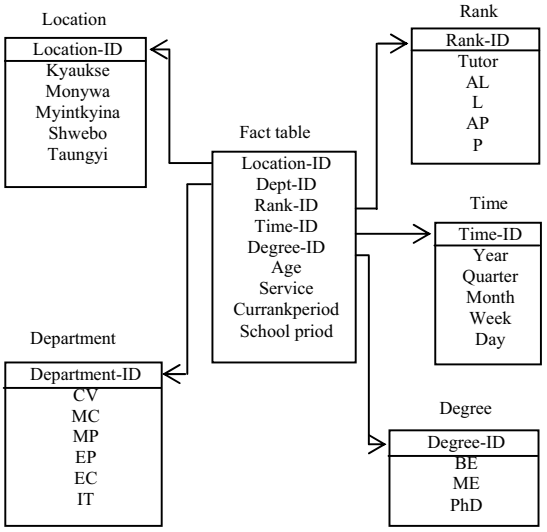

Figure 2. Star schema of this system

This star schema is presented one fact table and five dimension tables. Dimension tables are location dimension, department dimension, rank dimension, time dimension, and degree dimension. In the schema, the rank dimension table contains the attributes set {Rank-ID, Tutor, Assistant Lecturer, Lecturer, Associate Professor, and Professor}.

A star schema is a key concept for data warehousing. The star schema organizes data into a format that is easy for business users to understand. It allows application developers to standardize ad-hoc queries. Star schema can be implemented for multidimensional database schema. It has four components: facts, dimensions, attributes and attribute hierarchies [6].

Fact tables are the large tables "in the middle" of a dimensional schema [5]. Facts are generally numeric in nature, allowing aggregation of those numeric values into analytical data warehouse reporting structures. Fact tables simply link to more descriptive dimension tables [6].

Dimensions qualify characteristics that provide additional perspectives to a given fact. Each dimension and facts are a collection of attributes. Star schemas tend to perform the best in decision-support applications. Most data warehouses use a star schema to represent the multidimensional data model [9].

3.3. *Online Analytical Processing (OLAP)*

Data warehouse systems serve users or knowledge workers in the role of data analysis and decision making. Such systems can organize and present data in various formats in order to accommodate the diverse needs of the different users. These systems are known as online analytical processing (OLAP) [9].

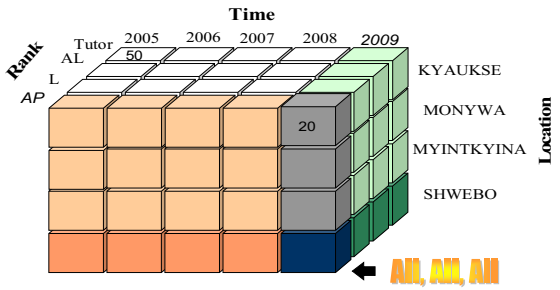

Figure 3. A Multidimensional Data Model

Fig. 3 shows a multidimensional data model. The significance of a "multidimensional view" of data is that it allows decision-makers to view many summarized data, historical data records, and groups them by subjects [6].

Part of the OLAP implementation process involves extracting data from the various data repositories and making them compatible. Data stored by operational systems such as point of sales, created quickly on the database and the results can be recalled by administrator.

IV. SYSTEM DESIGN

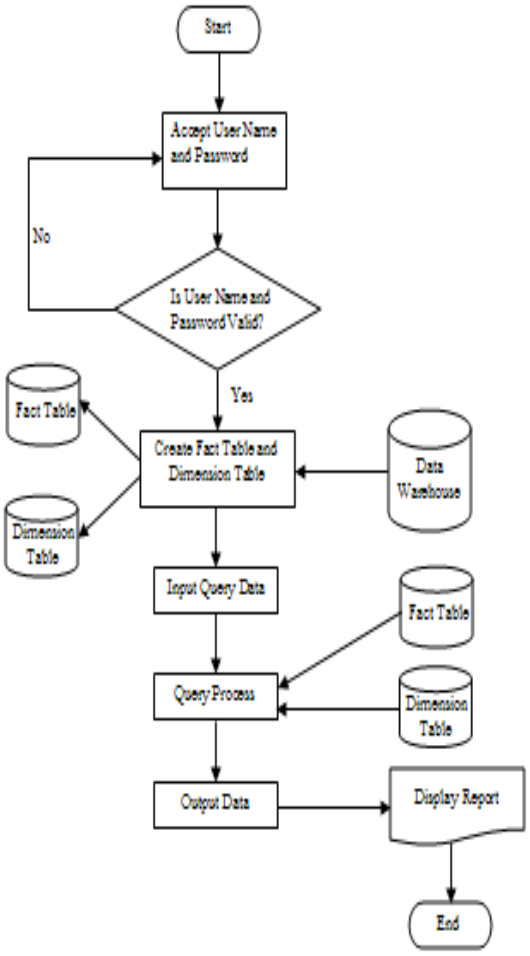

Figure 4. System Flow Diagram

The above Fig. 4 demonstrates "how to input into OLTP, how to extract and move into warehouse and how to retrieve the required data from warehouse using OLAP. There are many branch technological universities in Myanmar. Data from those operational sources are extracted and integrated into warehouse. Only authorized users access the staff data from the data warehouse according to their respective rolls.

Firstly, the user name and password are required. If the user name and password are correct, the staff data in technological universities are displayed as a data warehouse. And then, fact table and dimension tables are separately created from data warehouse. If the user wants to know about someone data, he or she types the input query data. When the query process is started, the data are extracted from fact table and dimension tables. Finally, the system displays the output data to the user as OLAP reports.

V. IMPLEMENTATION RESULTS

When the program is run, the user login form appears in Fig. 5. In this form, Login process reads the user name and password and checks whether these data are valid or not.

If the user name and password are correct, the system permits the user to enter the system. If the password is incorrect, the system does not allow the user to enter the system. The user must try again to enter the system until the user name and password are correct.

Figure 5. User Login Form

5.1 Main Form

When the user name and password are correct, the main form dialog appears in Fig. 6.

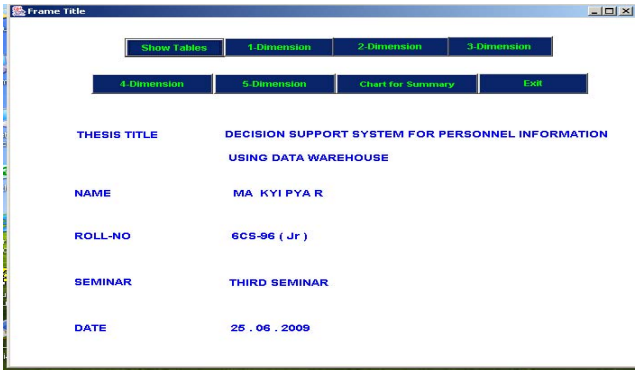

Figure 6. Main Form

The main purpose of the system is to analyze the personnel data. The data warehouse and OLAP could produce query processing and maintenance issues. In this system, personnel data are considered into five dimensions such as Time, Location, Department, Degree, and Rank.

5.2 Dimension menus from staff warehouse

Fig. 7 shows personnel data by time dimension view. In time dimension, the user can analyze staff data from various viewpoints by monthly or yearly. Fig. 8 shows personnel data by location dimension view. In this dimension, the user can analyze location of staff. Fig. 9 shows personnel data by rank dimension view.

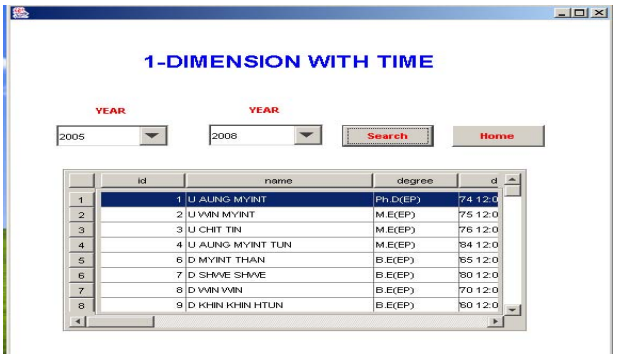

Figure 7. Personnel Data with 1-Dimension (Time)

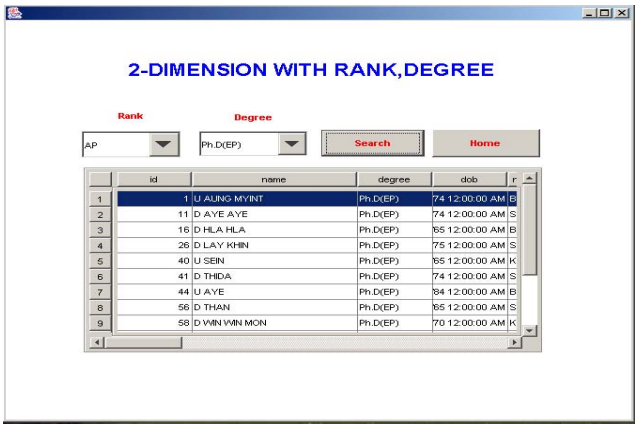

Figure 8. Personnel Data with 2-Dimension (Rank, and Degree)

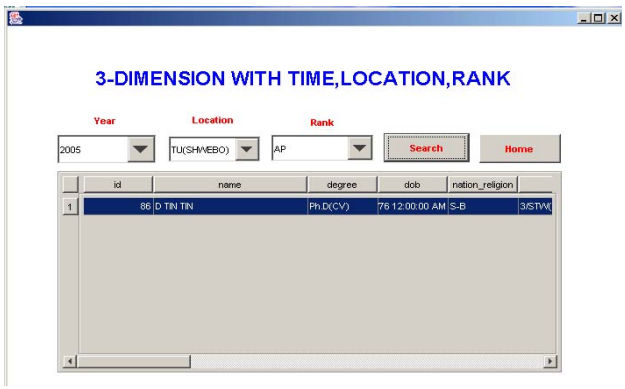

Figure 9. Personnel Data with 3-Dimension (Time, Location, and Rank)

Fig. 10 shows personnel data by department dimension view. In department dimension, the user can analyze department of staff in each university. Fig. 11 shows personnel data by all dimension views. In all dimensions, user can see analysis all dimension information from various viewpoints by staff's name, age, service, location (university), and degree.

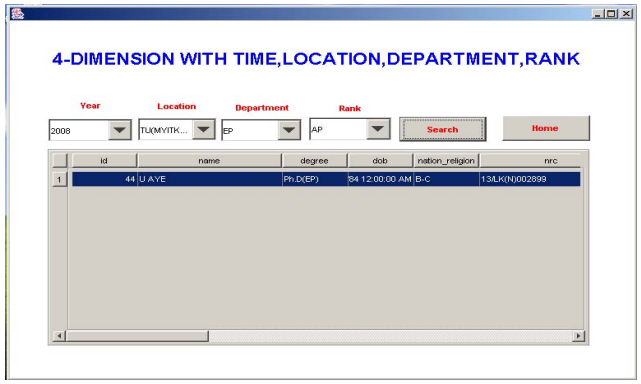

Figure 10. Personnel Data with 4-Dimension (Time, Location, Department, and Rank)

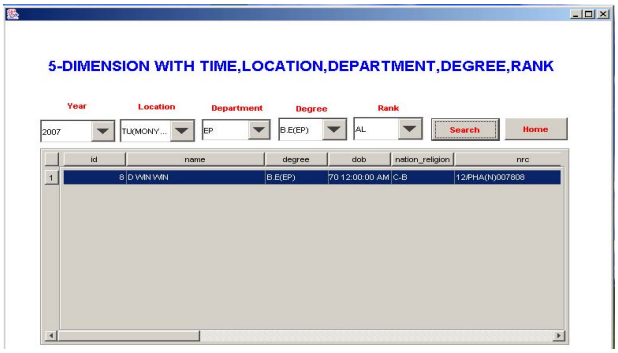

Figure 11. Personnel Data with 5-Dimension (Time, Location, Department, Degree, and Rank)

5.3. *Graphical Reports of the System*

The following figures are examples of graphical views of report. In Fig. 12, the bar chart illustrates the total teachers in each university. Fig. 13 shows the total PhD holders in each university are depicted. Fig. 14 shows the total teachers in each department in Technological University (Kyaukse).

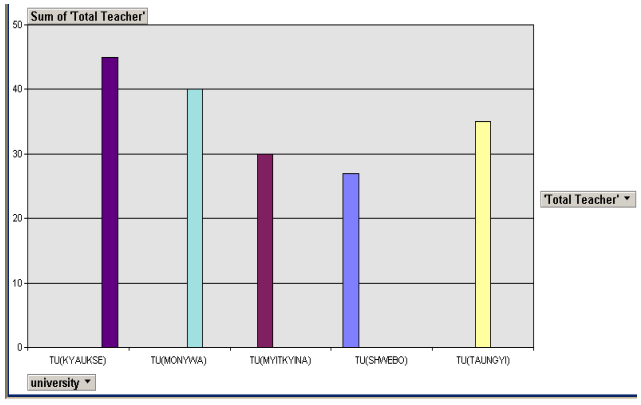

Figure 12. Chart for Arrival Total Teachers to each University (2005-2009)

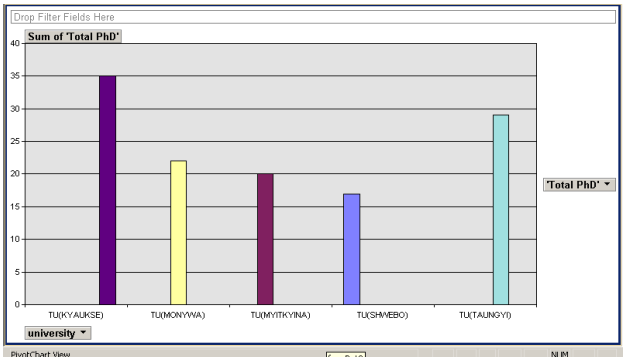

Figure 13. Chart for Total PhD Teachers to each University (2005)

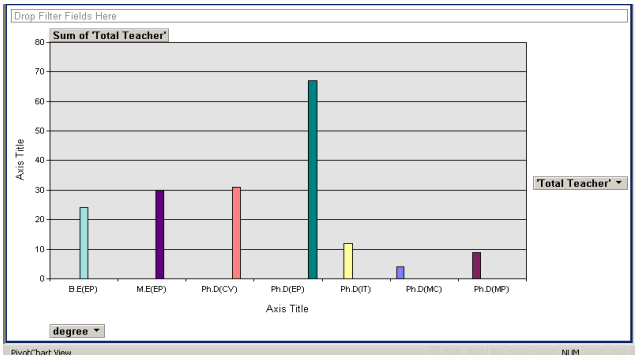

Figure 14. Chart for Arrival Total Teachers in KYAUKSE TU (2005)

5.4 Table Design of the System

The following Table I shows yearly summarized data in five technological universities.

Table I. Yearly Summarized Data

Year	University	Total Teachers
2005	KYAUKSE TU	280
2006	MONYWA TU	250
2007	MYINTKYINA TU	200
2008	SHWEBO TU	180
2009	TAUNGYI TU	230

VI. CONCLUSION

In Today's Global economy, IT manager needs the ability to quickly implement robust and scalable. Data warehouse makes the employees smarter decisions to stay competitive.

Decision support systems provide the field of query optimization with increasing challenges in the traditional questions of selectivity estimation that can exploit transformations without exploding search space. The aims of this paper are to understand what the data warehouse and protect the sensitive information stored elsewhere in data warehouse.

In the system, management level of system can review all records of historical data for monthly or yearly as user desired item for each dimension. This system is developed to easy access for frequently needed data, to improve end-user respond time. The paper results in accumulation of growing amounts of data in operational databases. The system can help to retrieve complex query analysis report. In this paper, we analyze personnel information by using Data Warehouse and OLAP tools.

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