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Integrating DSS in Student Courses Management System

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Abstract— Decision support system is the key of every institution for a successful decision making. This study aims to integrate a decision support system in the Computer Arts and Technological College, Inc. to avoid the waste of valuable data sources due to incorrect representations of data. With the help of data warehouse the administrator have easily drawn a conclusion based on the given data sources. To come up with the project the integration of Pentaho Data Integration tools have used in order to extract, transform and load a data into the CATC-DW.

This project was also concern to lessen the job of the staff in the office of the institutions because through the used of the data warehouse they do not need any more to collect and merge manually the different data. This paper also concern to lessen the cost of building a data warehouse because the researcher prepared an open source tools for data integration. And lastly the paper focused on the importance of integrating DSS in the institutions. It explained the type of data sources and the previous way of decision support used by the institutions with and without DSS.

Keywords- *ETL; Kettle; DSS;*

I. INTRODUCTION

The success of a business often hinges on good decision-making. Every manager faces decisions on how to run their organizations to gain or maintain a competitive edge. Some decisions are simple, but most are quite complex and require the manager to consider many factors or variables. This leads organizations to employ computer-aided decision support systems. A Decision Support System (DSS) is a part of the information system discipline focused on supporting and improving managerial decision-making. DSS includes personal decision support systems, group support systems, executive information systems, online analytical processing systems, data warehousing, and business intelligence.

In its 36 years of existence, CAT College has produced thousands of enrollees and graduates from different courses. Regarding the CAT College student information system, they consistently produce accurate enrollment numbers every year. However, with this large volume of data from various sources and types, the school sometimes wastes important data. They also commit errors in attempting to perfect the records. Additionally, students sometimes change their courses unexpectedly. These actions require frequent updates and adjustments to student records to reflect the accurate number of enrollees and transferees each year. Because of this problem, administrators find it difficult to determine which courses need improvement, as they experience a high number of transferees each semester and a decrease in enrollments each year. Administrators struggle to identify the underlying problems because they lack a reliable basis for each student's course records. They cannot accurately measure enrollment numbers from previous to current years because they save information in different sources, making it impossible to update each Excel file as changes occur.

To integrate a decision support system into the institution, we first need to define the tools required to extract, transform, and load data. The data will be obtained from the existing enrollment system, grading system, and other Excel files used by the school. The next step is to transform the data into a single CSV file and load it into the data warehouse so that the system, called the CATC Data Warehouse System, can generate graphs from the data entry. The objective of this paper is to demonstrate that integrating a decision support system into the institution can lead to successful decision-making for the future.

According to KP Tripathi, Decision Support Systems (DSS) are computer-based information systems designed to help managers select one of many alternative solutions to a problem. It is possible to automate some decision-making processes in a large, sophisticated, computer-based DSS, which can analyze

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vast amounts of information quickly. This helps corporations increase market share, reduce costs, increase profitability, and enhance quality. A Decision Support System (DSS) is an interactive, computer-based system that helps decision-makers use data and models to solve structured, unstructured, or semi-structured problems (Gore, 1983). Decision support systems can aid human cognitive deficiencies by integrating various sources of information, providing intelligent access to relevant knowledge, and aiding the process of structuring decisions. They can also support choices from among well-defined alternatives (Castro-Schez, Jimens, Moreno, & Rodrigues, 2005). Thus, decision support systems can adapt to any changes due to technological advancements and respond efficiently and quickly to decision-makers, facilitating the decision-making process and enhancing organizational empowerment, whether for individuals or groups.

In most organizations, valuable data is wasted due to its different formats in various sources. Data warehouses (DWs) are central repositories of integrated data from disparate sources, designed to support the decision-making process. The Extraction-Transformation-Loading (ETL) processes are key components of DWs, making the selection of ETL tools a complex and important issue in DWs. ETL involves extracting data, transforming it to the desired state by cleaning it, and loading it into a target database (Mali and Sachin Bojewar). Thus, ETL can be used to integrate a decision support system into an organization by implementing a data warehouse with the help of the chosen ETL tools.

II. UNDERSTANDING DATA SOURCES

To store the list of enrolled students, the school uses the Enrolment system which employs the MySQL database. It contains all student information, including enrollment dates, status upon enrollment, chosen courses, and year levels. Regarding student grades, the institution utilizes separate data sources from the grading system, along with separate Excel files for the list of graduates. Currently, if administrators wish to determine the percentage of enrolled students in different courses or to identify the number of students who have left the school, they must access various sources and analyze them individually. This sometimes results in the wastage of valuable data due to difficulty in achieving optimal results.

Pentaho Data Integration is an open tool that can be downloaded and used to extract data from various sources. With the help of this tool, the institution's data sources can be collected and merged easily, facilitating the integration of the decision support system. This allows administrators to effectively utilize the vast amount of data stored by the institution.

III. APPLICATION OF PENTAHO DATA INTEGRATION

ETL (Extract, Transform, and Load) is a process in data warehousing responsible for extracting data from source systems and loading it into a data warehouse. It involves three tasks: extracting data, transforming data, and loading data.

A. Extracting the Data

The extraction of data involves converting data from various sources. Currently, the school uses different sources to maintain records of their students. For instance, the enrollment list and student grades are stored in a system where data is stored in operational databases like MySQL. Meanwhile, the list of graduating students is stored in flat files such as Excel files. Therefore, when administrators need to analyze data and make decisions, they must retrieve data individually from these sources and compare them manually.

Integrating a Decision Support System (DSS) and using Pentaho Data Integration for data extraction can solve this issue. To illustrate the data extraction process, let's assume we need to extract three different Excel files: a list of transferring students, a list of enrolled students, and a list of graduated students. The figure below depicts the data extraction using Pentaho.

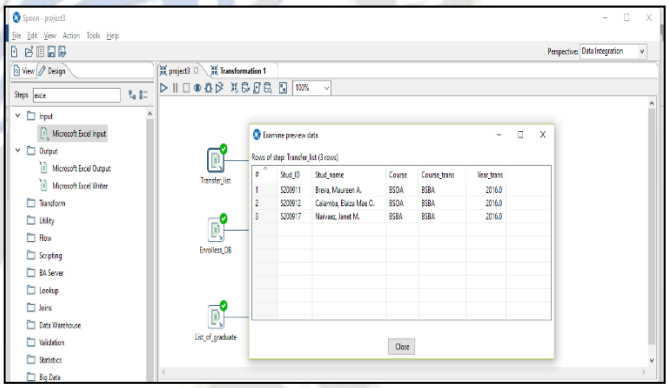

Figure 1. List of Transfer

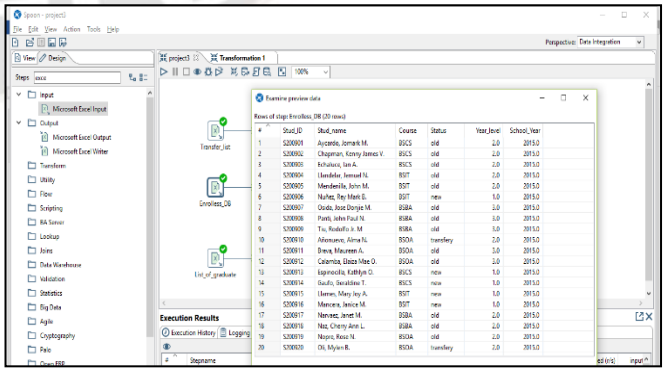

Figure 2. List of Enrollees

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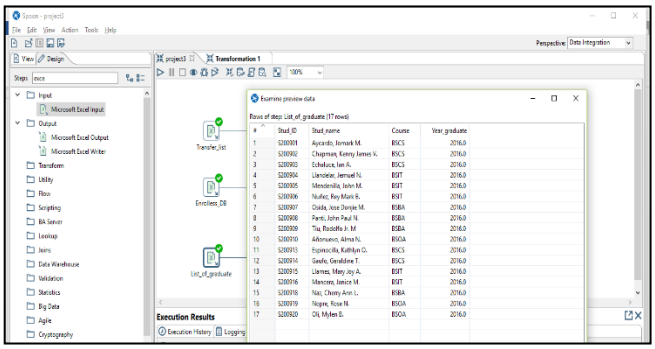

Figure 3. List of Graduate Students

B. Transforming the Data

After the extraction of data in Pentaho, the tool will undergo different tasks for the transformation of data. First, the data will undergo mapping, such as changing from NULL to 0 or from 'Male' to 'M'. Second, it needs to filter by selecting only certain columns or vice versa. Third, transposing rows and columns. Lastly, applying any kind of simple or complex data validation. The figure below will show the transformation of data based on the three data files that we extracted.

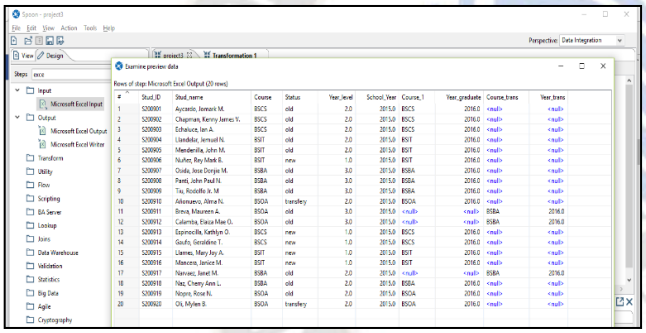

Figure 4. Output from three tables

C. Loading the Data

After the extraction and transformation process, Pentaho Data Integration will generate the final output that can be saved into CSV files. Once the output is in the CSV file, the CATC Data Warehouse System will import the data into its database to generate a graph and a table list according to the data needed by the administrator. The figure below shows a screenshot of the system.

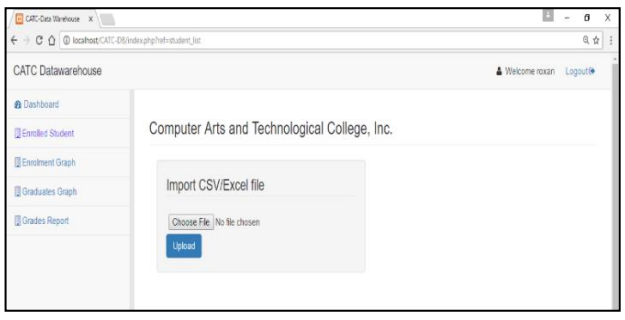

Figure 5. CSV files

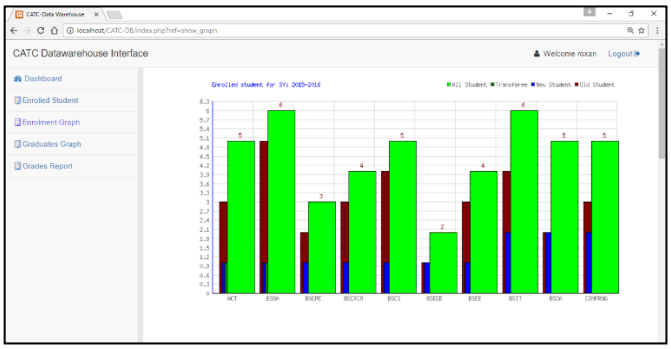

Figure 6. Generate a graph of CATC Data

IV. FINDINGS

Having an application with an integrated decision support system will serve as a significant aid for institutions to complete tasks easily within a short period of time. A DSS is a computer-based information system that supports business or organizational decision-making activities. It serves as the foundation for organizations to address various challenges and decide on suitable solutions. The decision support system transforms decision-making processes for students by efficiently recording and grouping multiple flat file records into meaningful outputs. This capability allows the tool to save and consolidate data from different sources.

Having a complete record consolidated from various Excel files makes it easier for users to update student records. One advantage of using this tool is that it helps users decide which fields are necessary, which need updating, and which should be displayed. The tool allows users to customize each Excel file according to their needs and the fields within those files that need to be utilized.

Furthermore, the DSS serves as a basis for measuring enrollments every year, providing charts that display processed results. It assists administrators in making decisions by enabling them to review records from previous and current enrollments. They can compare enrollments year by year to determine trends, whether they are increasing or decreasing, and take immediate action based on up-to-date enrollment data provided by the DSS.

V. CONCLUSION

With the help of the CATC Data Warehouse, the system provides an interactive computer-based system that helps decision-makers use data and models to solve structured, unstructured, or semi-structured problems. The system can generate graphs that dynamically change once additional data is imported. Thus, with this capability, Computer Arts and Technological College, Inc. can avoid wasting valuable data stored in different formats across various sources. Integrating the Decision Support System helps institutions easily analyze data. Through DSS, the institution can now easily identify the number

of students enrolled, transferred, or graduated in particular courses they offer.

VI. Acknowledgment

The researchers would like to acknowledge the support of Pentaho Data Integration for providing the ETL tool to extract, transform, and load the data. It has provided the necessary information needed to integrate the DSS into the student course management system. Without this information, the study would not have progressed this far.

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