

**DASHBOARD BUSINESS INTELLIGENCE UNTUK
MENDUKUNG PROSES PERWALIAN PROGRAM STUDI
TEKNIK INFORMATIKA UNIVERSITAS KRISTEN DUTA
WACANA**

Skripsi



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PROGRAM STUDI TEKNIK INFORMATIKA FAKULTAS TEKNOLOGI INFORMASI
UNIVERSITAS KRISTEN DUTA WACANA
2017

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Skripsi



Diajukan kepada Program Studi Teknik Informatika Fakultas Teknologi Informasi
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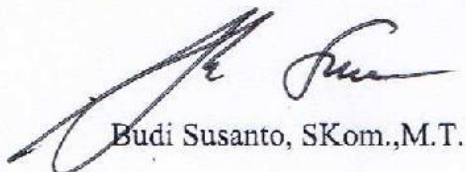
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**Business Intelligence Dashboard for
Duta Wacana Christian University
Information Technology Department's
Perwalian Agenda**

BIT305

Final Year Project II

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Project Period: September 2016 – March 2017

Abstract

This report is a project documentation of HELP and DWCU student's Final Year Project II. The main reason of this project is to apply the importance of data for an organization. Data from past transactions contains valuable information to monitor and control the current organization's climate. This information about the organization could be easily achieved by providing correct and on point analytical data. These data could then be used to support the decision making for managers and stakeholders to improve the organization's performance. The output of this project is to serve this analytical function in form of dashboard system. This system includes the data warehouse, where the data stored for analytical purposes and serves in the back-end of the system, and the business intelligent system, where those data could be visualised in order for managers to obtain golden nuggets of data of the current organization climate on the front-end.

The main idea of this project is to implement the earlier stated system for Duta Wacana Christian University. This organization is an academic non-profit organization. Unlike profit oriented organization where its main purpose is to achieve sales profits as the economic law stated, this organization identifies their success based on the students' progress and achievements. Duta Wacana scheduled a *perwalian* agenda every semester for academic supervisor and student sit together to discuss their study plan to achieve better result in the next semester. By introducing data warehouse and business intelligence system into their *perwalian* agenda, both involved lecturers and students can monitor student and course's performance.

The result of this project is a dashboard system that implements data warehouse and business intelligence. By implementing this system, academic supervisor and students will benefit the easiness to view the data. This visualisation supports their decision making process on deciding future study plan in *perwalian* agenda.

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February 2017

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This project will not be possible without the help of a number of people. I would like to express our deepest gratitude to Mr. Budi Susanto and Mrs. Gloria Virginia who has devoted much of his time to supervise me in this project.

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List of Symbols and Abbreviations

CSS	Cascading Style Sheets
CSV	Comma Separated Value
DB	Database
DOS	Disk Operating System
DM	Data Mart
DW	Data Warehouse
DWCU	Duta Wacana Christian University
EDW	Enterprise Data Warehouse
ERD	Entity Relationship Diagram
ETL	Extract Transform Load
HTML	Hypertext Mark-up Language
IT	Information Technology
KPI	Key Performance Indicator
PDI	Pentaho Data Integration
RDBMS	Relational Database Management System
SQL	Structured Query Language

Abstract

This report is a project documentation of HELP and DWCU student's Final Year Project II. The main reason of this project is to apply the importance of data for an organization. Data from past transactions contains valuable information to monitor and control the current organization's climate. This information about the organization could be easily achieved by providing correct and on point analytical data. These data could then be used to support the decision making for managers and stakeholders to improve the organization's performance. The output of this project is to serve this analytical function in form of dashboard system. This system includes the data warehouse, where the data stored for analytical purposes and serves in the back-end of the system, and the business intelligent system, where those data could be visualised in order for managers to obtain golden nuggets of data of the current organization climate on the front-end.

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The result of this project is a dashboard system that implements data warehouse and business intelligence. By implementing this system, academic supervisor and students will benefit the easiness to view the data. This visualisation supports their decision making process on deciding future study plan in *perwalian* agenda.

Chapter 1: Proposal

1.1 Project Summary

The project outline is to construct an analytical view of the existing data by applying data warehouse system which is integrated with business intelligence. The system will be implemented as a decision support system for *perwalian* in IT department which held at every beginning of the semester by the faculty to help students plan their course and schedule. Due to security reasons, the data source will not be fully integrated but will be updated in every end of school year. Clean data will be visualized in this system. The data will be visualized as a dashboard application. By accessing the dashboard, both students and their academic supervisor will be provided information that are both required and beneficial for taking the best decision towards semester plan.

1.2 Company Background

Duta Wacana Christian University is a university located in Yogyakarta, Indonesia. The education are based in Christianity values and treasures the diversity within the students and lecturers. There are numerous of facilities and agendas inside the education process that will ensure the process itself had held well. In the IT department, there is an agenda called “*Perwalian*” which are held at the beginning, middle, and the end of semester to supervise and evaluate the progress of each students.

Perwalian at the beginning of the semester are scheduled to help students decide their study plan for the following semester and resolve any matters regarding the students’ study progress. Until 2016 school year, the designated lecturers responsible for the supervising process are only provided their students’ GPA and their study results history table. The academic supervisor then gave their advice for the students’ study plan based on those data. By implementing this Final Year Project 2, academic supervisors are provided with necessary data with decent representation in order to maximalise the *perwalian* output.

1.3 Issues with Current System

At the current *perwalian* agenda, academic supervisors only provided with each students' study result history and their GPA each semester. Those data are only represented with tables on a piece of paper. On each turn, lecturers checked the subjects that have been taken by each students, determining if any compulsory subject that have not been taken or have been taken but didn't meet the minimum scores, giving advice for suitable subjects of interest, and identifying matters inside the students' progress.

Errors already happened several times due to miscalculations either on determining students' progress or failed to identify matters that could be discovered as early as the *perwalian* agenda held every semester. This incapability ends up extending the students' study period at worst. These miscalculations and unidentified matters should be averted when lecturers and students provided with better representation of data and analysis on *perwalian* agenda.

1.4 Benefits and Constraints of Proposed System

The output of this project is a dashboard for *perwalian* agenda. This project provides both academic supervisors and students with data and analysis of elements needed for supporting decisions on determining the study plan for the following semester. This system adds a brand new view of the students and courses data in which necessary for analysis, identifying matters, and supporting decisions for the study plans.

This system is developed in an open source environment and hosted in faculty's server which makes the system easily accessed with internet connection. The ETL processes are done in Pentaho environment, a reliable open source environment that provides a numerous feature for processing big data.

The constraint of this system lies within the data source. For security reasons, our system could not integrate automatically with the University's data warehouse.

The data source are needed to be updated every semester to provide the most actual data. The University's data centre will only issue the data table in Microsoft Excel's .xls format by request which would affect the ETL processing time to update clean data.

1.5 Project Description

This dashboard system is maintained by the faculty administrator to update data on the back-end. The system with the latest data then accessed by academic supervisor and viewed by both lecturer and student in every time needed for *perwalian* session.

The dashboard system data is collected from *Puspindika*, the University's data centre, in Microsoft Excel format. The data will include students' basic data, courses, and grades in each semester. Those source data are cleaned through ETL process in Pentaho Data Integration on the next step.

The output of this ETL process is to obtain clean data that are suitable with the analysis needs which are the students' data, their scores, and the subjects. Clean data from the ETL process will be stored in the well-designed dimensional model. This dimensional model will represent every analytical data needed for *perwalian* and stored in the data warehouse.

After making sure the data are valid and reliable, those data then visualised in accordance with *perwalian's* requirement. The data will be visualised as dashboard business intelligence. The dashboard visualisation shows analytical information about students and subjects in order to support *perwalian* process in terms of time efficiency and validity.

This system's back-end includes the ETL process and storing the dimensional model in the data warehouse while the front-end is the dashboard business intelligence visualisation. The system diagram is illustrated in figure 1.1.

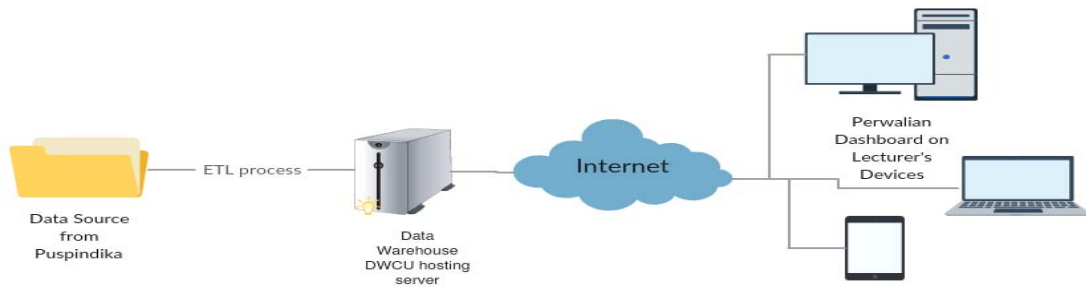


Figure 1.1 System Diagram

1.6 Project Aims

The project's aim is to construct a system to support *perwalian* agenda by using business intelligence dashboard. The system includes data warehouse system to provide reliable environment for data analysis. By providing better analytical data, lecturers and students will have a better view about the students' state and progress for better decision making at *perwalian* agenda.

1.7 Project Objectives

There are several objectives for this project. Those objectives are:

1. To construct independent data warehouse for analytical purpose.
2. To create the dimensional model that aligns *perwalian* needs.
3. To build the business intelligence system (dashboard) that meets *perwalian* needs.
4. To provide academic supervisors and students visualization of students' status and progress for deciding study plan.

1.8 Project Scope

This project will have several scopes. Those are:

1. The system will be able to clean the data from *puspindika* data source before it is stored in the data warehouse system.
2. The system will be able to store the clean data in to a specified dimensional model.
3. The dimensional model will be designed based on *perwalian* needs.
4. The dashboard will be able to monitor the students and subjects' state and progress to develop a good study plan.

1.9 Software and Hardware Requirements

The project needs several hardware and software to support the project.

Hardware used in this project:

- Hosting Server:
 - CPU: Quad 2GHz+ CPU
 - RAM: 6GB
 - Minimum database space: 10GB
- Computer :
 - Processor: 1.7 GHz, Core i3
 - RAM: 4GB
 - Hard disk: 500GB
- Modem
- Devices with browsers for academic supervisors' devices.
- Several back up drives

Software used in this project:

- Microsoft Project 2010
- Xampp
- Microsoft Visual Studio 2010
- Microsoft Windows 10 64bit

- Pentaho Data Integration 4.4.0
- Chrome Browser

1.10 Development Methodology

Methodology used for this project's system development is the Rapid Application Development (ProjectManagement.com, 2013). This methodology is the most suited methodology for our project because it offers a plan for a limited and short duration. The iteration for development and testing will make sure the system will satisfy the customer.

Using this methodology, our project starts with collecting requirement and then start developing a prototype that satisfies the customer. The project then proceed to developing the system and then after the implementation the system will do iteration of testing and maintained by removing bugs until the system is stabilized.

1.11 Project Plan

The project plan and timeline are listed on the Gantt chart on Appendix A.

1.12 Vision

This project will be used as the decision support system for *perwalian* that provides reliable and crucial informations needed by both academic supervisor and student to develop a good study plan and achieve maximum output of the educational process in Duta Wacana Christian University.

Chapter 7: Conclusion

7.1 Introduction

While the dashboard project has been finished, there are still more rooms for further improvements. Data warehouse and its visualization as dashboard business intelligence were successfully built. The system fulfils user requirements stated at the beginning of the project. Yet in testing phase, testers found several points that could add value for our future work. This chapter covers those points for further improvement, future work, and this project summary.

7.2 Further Improvement

There are several issues found by the testers in this project. The dashboard is lacking on some gimmicks in order to visualize the data better. This issue could be overcome by utilizing different visualisation tool. The visualisation tool used in this project is an open source javascript which could also an issue to the reliability.

There is another room for improvement regarding the system's data. The data used to build this project are only students grades recorded since 2010-2017. Some features in the dashboard could be improved by importing older grade history.

This system also needs an improvement in terms of security. Some of the data stored in the system's data warehouse are sensitive informations. In order to safely hosted data in the cloud, proper cryptography method is needed to secure those data. This could also supports conducive environment for integrating data with *puspindika* for future work.

7.3 Future Work

This system works successfully in *perwalian* DWCU's IT Faculty. For future work, this kind of system could possibly be implemented across faculties in DWCU. As mentioned before, there should be a project with proper security implemented in the system in order to safely integrate data directly from *puspindika*. By integrating

data directly from *puspindika*, this system's future work might hugely improve in terms of things that is able to analyse. Implementing OLAP cube for analysing could be possible in order to support manager-level academics decision making by head of faculty.

7.4 Summary

The project were proposed to develop a system that supports *perwalian* by providing visualisation of data required for analysis. The system consists of two main parts which are the data warehouse and the dashboard business intelligence. A properly designed data warehouse is required to maintain the system's data. Business intelligence in form of dashboard visualizes data which plays an important part to support *perwalian*.

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