

# Dashboard Information System for Student's Character Assessment

Dony Saputra \*, Dedi Royadi \*\*, Zainul Hakim\*\*

\* Department of Digital Communication, Faculty of Green Economy and Digital Communication, Surya University

\*\* Department of Information System, Faculty of Information System, STMIK Bina Sarana Global

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## Keywords:

Data warehouse  
Business Intelligence  
Character assessment  
UML  
Requirement elicitation

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## ABSTRACT

With growth of industrial requirement for skilled labor that had not only high academic skills but also good character, Schools and university faced challenges to produce students who have good GPA and good character. In this case most Schools and university can't provide it, because of no record or framework for assessing it. This research is aimed to design student character assessment application using Dashboard Information System to analyze the data with a model that based on Multidimensional Online Analytical Processing (MOLAP) in a data warehouse. For framework design and IO design we use UML diagram and requirement elicitation. Result of this research is creation of a dashboard information system application for assessing student's character.

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## Corresponding Author:

Dony Saputra,  
Department of Digital Communication, Faculty of Green Economy and Digital Communication,  
Surya University,  
Jl. Scientia Boulevard Blok U/7, Summarecon Serpong, Tangerang, Banten, Indonesia.  
Email: dony.saputra@surya.ac.id

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## 1. INTRODUCTION

Today industry challenge is to have worker that is not only good in academic performance as a hard skill, but they also have good character as a soft skill such as discipline, creative, good communicator and collaborator, responsible, reliable and trustworthy. But school and university doesn't provide a measurement for student's character, they only have academic score that is written in GPA. All of this are caused by they have no record or framework that asses and measure student's character. So the output from university doesn't meet with industrial needs.

This research was aimed to develop a framework and application for assessing student's character that can be recorded and analyzed. The data will be store in a data warehouse, processes using MOLAP and presented in a form of Dashboard Information System. The system were built to help academic division, to asses character as a soft skill that will be presented as character score beside their academic GPA after they graduated from university. For university management to have a holistic preview that can be drill down or roll up, on student's character as soft skills to meet industrial need and divide in classes, faculty, period of time until each student personal character record.

Business intelligence (BI) is the ability of an organization to collect, maintains, and organizes knowledge. This produces large amounts of information that can help develop new opportunities. Identifying these opportunities, and implementing an effective strategy, can provide a competitive market advantage and long-term stability [2]. Whereas An OLAP system is a data analytical tool that use by knowledge workers for decision making. These systems provided historical view of large data, summarization and aggregation and manage information at different levels of granularity. There are three major types of OLAP. There is Relational OLAP (ROLAP) that worked by extracting data directly from data warehouse using traditional OLAP in a relational database. While Multidimensional OLAP (MOLAP), data are pre-summarized and stored in an optimized format of multidimensional cube. By this model data are structured into format that in-line with a client's requirement with calculations pre-generated on the cubes. To bridge ROLAP and MOLAP technology there is Hybrid OLAP (HOLAP)[19].

Dashboard is an easy to read, often single page, real-time user interface, showing a graphical presentation of the current status (snapshot) and historical trends of an organization's key performance indicators to enable instantaneous and informed decisions to be made at a glance[6]. BI information flow is presented to the manager via a graphics display called a Dashboard the same function as a car's dashboard.

Specifically, it reports key organizational performance data and options on a near real time and integrated basis [17].

Various well know leaders in the field of character education have offered definition of it. The goal of character education is to help children to develop good dispositions that will enable them to flourish intellectually, personally, and socially [1]. Character education is the deliberate effort to develop good character based on core virtues that are good for the individual and good for society [15]. To classify character assessment, this research use Six Pillars of Character that is defined by Josepshone Institute. Six pillars of character is use because its neutral way in assessing character without racial issues and its detail framework of character assessment [14]. It is define as ethics in terms of moral duties and virtues that flow from six core ethical values, that is Trustworthiness, Respect, Responsibility, Fairness, Caring, and Citizenship [14].

Table 1. Literature review

Authors	Method	Result
Dirgayusari,Ayu Manik[7]	Dashboard System Prototype	Our research take this paper dashboard system theory and model
Nadhiroh , Nur Aini Ulfah[15]	Dashboard System Prototype	Our research take this paper dashboard system definition
Susilowati, Endang[19]	Character assessment using interview	Our research take this paper character assessment variable as a model comparison to six pillars variable.
Pauwels, K., WieselT., Wierenga,B.,Skiera,B.,Reibstein,D.,Lapointe., and Clark,B[18]	Marketing Dashboard	Our research take this paper the dashboard model visualization and key performance metric for measurement and database extraction

Based on some research above, the concept of dashboard system is always separated from the concept of character assessment, whereas in this research the dashboard information system were coupled with students character assessment in a framework and application which can provide an informative view and easier way to analyze students character.

## 2. RESEARCH METHOD

Research background for this study is shown in the figure below.

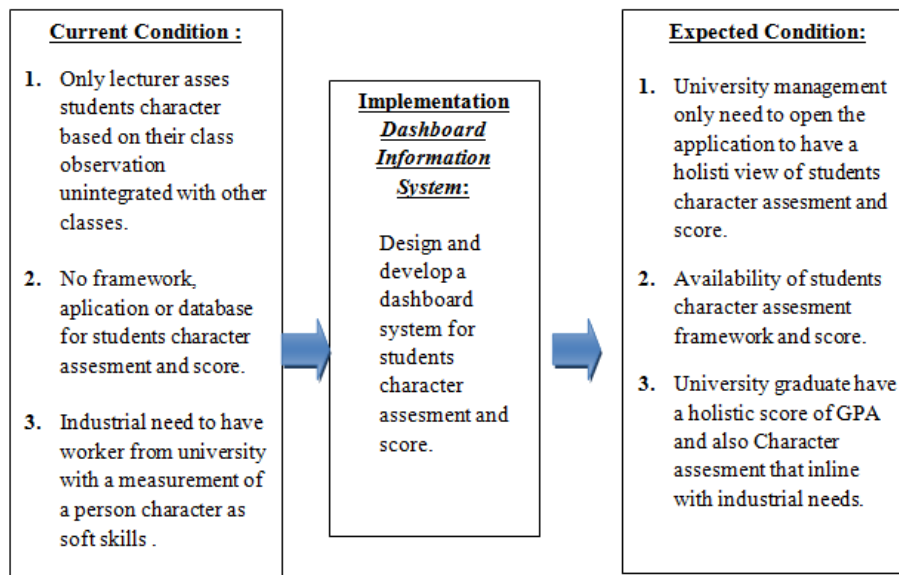


Figure 1. Research Background

Research method were used in this paper are divide into two part, as a framework and system design we use object oriented models, represent by use case diagram and requirement elicitation. While the design of BI model, we use application architecture and OLAP Design. Research steps will be divided into several

steps In The first is Requirement Elicitation (RE) Interview, we purpose a prototype system and had an interview with academic head, Dean and Rector to discuss about it. The second is literature review study, where we enrich this paper with related article on Business Intelligence, OLAP, Dashboard System, student's character assessment and how to model it. The third is finalization of RE we made up an RE form that included a functional and non-functional input, process and output for the system that previously discussed on first step. We've agreed based on the RE form with signature from university management represent by dean and our research team. The fourth is Framework and system design, we design a rubric and content of character assessment based on six pillars of character to be inserted in every subject assessment. After that we design system flow by using use case, activity, and sequence diagram of Unified Modeling Language (UML). At the end we design an architectural model to have a better view how the dashboard information system runs. On Dashboard Information System development, we build up a data warehouse (cubing and ETL), MOLAP techniques and Develop all the code following all the design above.

For Six Pillars of Character on CA assessment we use multidimensional modeling that shown in figure below:

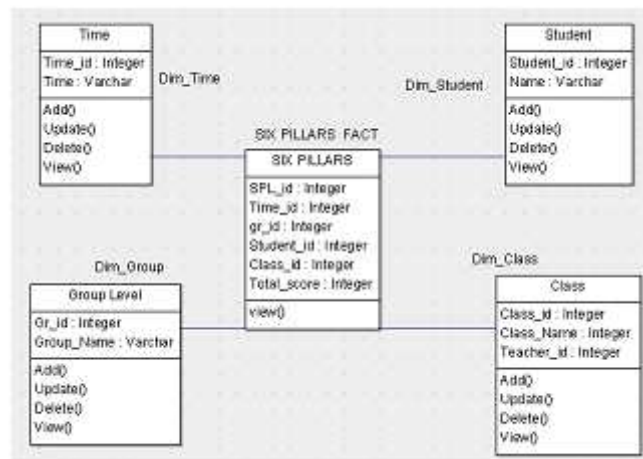


Figure 2. Six Pillars(SPL) Dimensional model

In the figure 2, the table divided into one fact table of Six Pillars(SPL) and 4 dimension table of class that can be drill down per student class, time for drill down period of time (month, semester, annual), group can be drill down per subject, and student that can be drill down per student based on their student id.

### 3. RESULTS AND ANALYSIS

We use use case diagram of UML to model the system as shown in the figure below.

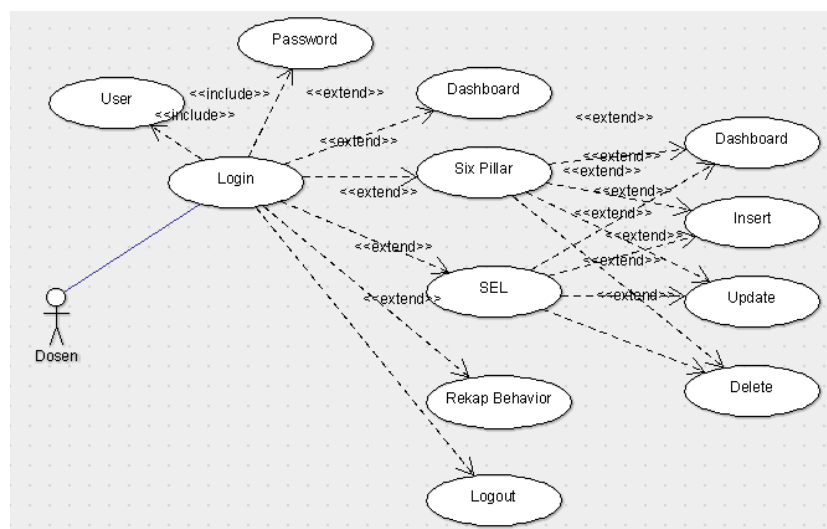


Figure 3. Lecturer dashboard use case diagram

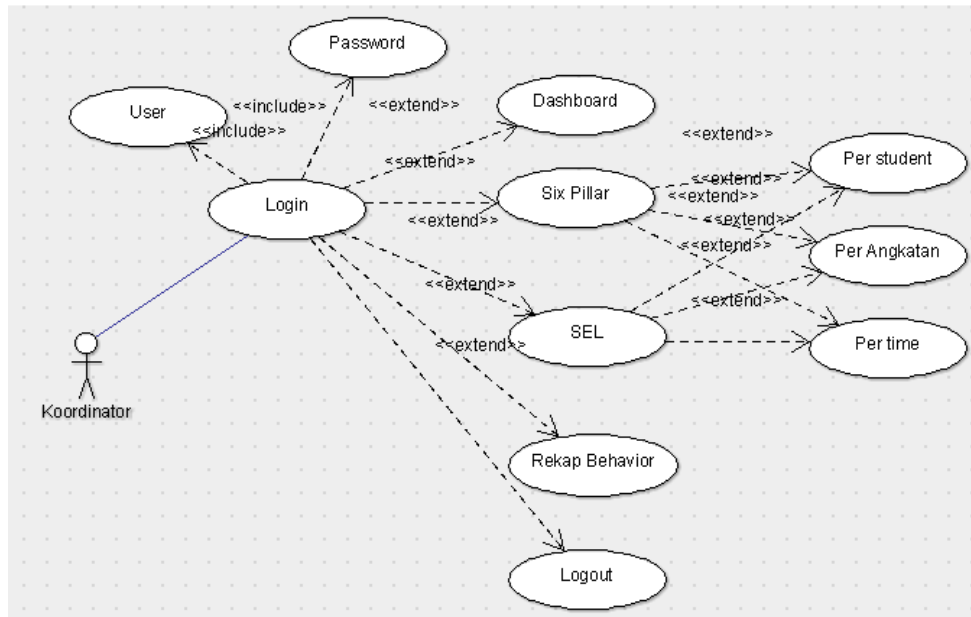


Figure 4. Coordinator dashboard use case diagram

Based on those two use case diagram, all the entry of students CA are done by the lecture and the full management dashboard can be viewed by academic head as all the process will be done by application. The lecturer have to login into the application and input the data per subject by semester based along with the student academic score. After all score have been input then academic head can see all the CA score on the dashboard. And able to print it out grouped by class, subject and each student's CA record to be given to student along with GPA Score.

Figure 5. SPL entry

In figure 5, it shows data entry form for SPL. In this form lecturer name and student name use autocomplete feature using JQuery language, so if we type one letter or number, it will automatically shows data in database related with that number or letter from id field and name field.



Figure 6. Dashboard overview of SPL

In figure 6. It shows graphical general CA score based on Six Pillars on each class that can be drill down into detail class.

In this study the tests were performed are black box testing for unit testing to see if every action of the program react to it, the inter-browser testing using an online browser tester that is browsershots.org with result, the fastest load time is by using Google Chrome for  $\pm 15$  seconds while Mozilla Firefox and opera  $\pm 25$  second, for testing the HTML code we use [www.validator.w3.org](http://www.validator.w3.org) stating that the code is in conformity with the standards of WWW, for testing PHP code we use Simple Test application from [simpletest.org](http://simpletest.org) which states that no problems on the application PHP code and for load time tests, we use an online website tester that is [loadimpact.com](http://loadimpact.com) with result of application load time from multiple locations is  $\pm 15$  second.

Implication of this system in managerial view is university management can see a holistic and detail view of student character data that can be analyze to help decision making on how to give value to student graduate from their university and answer industrial challenge. The management also has a design framework and system on student's character assessment that can be view as a dashboard, drill down and print out along with GPA score. By developing this dashboard information system framework, lecturer only need to entry student's CA score per subject for final score on semester base, the system will process all data and sat the end student will have their character assessment score just like their GPA score. Because of that, lecturer needs to be trained on how to use this system. Result of this research can be reference for next study in developing different model of character assessment using different technique of data warehouse and data mining or develop it on the cloud or mobile base system.

#### 4. CONCLUSION




These system frameworks was designed by employing object oriented model, and visualize using dashboard system. While the application builds on using PHP language, MYSQL database and fusion cart add on. For character assessment design framework we use Six Pillars of character from Josephson institute. With emphasize on trustworthiness, respect, responsibility, fairness, caring and citizenship. With this design framework and application the university management will have a holistic and detail view of each student's character assessment in an interesting and informative dashboard that can be analyze to support decision making, and print out along with GPA.

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	<p>Dony Saputra is lecturer in Surya University, Dony has two masteral degree, M.Kom from Budi Luhur University and M..M from Mercubuana University Jakarta. His research interest is business intelligence, artificial intelligence, web development and software engineering. Recently he is a member of IEEE for Internet of things society and computer science society.</p>
	<p>Dedi Royadi is rector and lecturer in STMIK BSG. Dedi has master degree in administration(M.Si). He has experience as a programmer, trainer and computer teacher. His research interest is IT entrepreneurship and digital marketing.</p>
	<p>Zainul Hakim lecturer in STMIK BSG, He has a M.Msi, from Gunadarma University. He has experience as technical consultant manager in PT Mndawani Mandiri. His research interest is IT Project Management and computer network and infrastructure.</p>