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DEVELOPMENT OF WEB BASED SCHOOL MANAGEMENT INFORMATION SYSTEM (A CASE STUDY APPROACH)

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ABSTRACT

The Objective of this research is to analysis and design web-based school management information systems that will provide leverage for school whom need the application to support the efficiency and effectivity of learning, teaching, and administration purposes. Analysis methods composed from two methods, which is current system analysis and recommended system planning. Current system data collection method included direct survey to school, interview, and research from literature. System design and recommendation method based on OOAD (Object Oriented Analysis and Design). We created the model of information system to provide solution and guideline to school when they want to develop management information system. Summary of this research is provided model of analysis and design to leverage school whom need the application to support the efficiency and effectivity of learning, teaching, and administration purposes.

Keywords: School, Information System, Analysis, Design, Learning.

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1. INTRODUCTION

Schools basically need information systems to improve their business processes to be more effective, the problems we encounter in schools today are rapid school growth as well as rapidly changing curricula, so the schools need an information system that can help operational and academic management at their school. Based on Brumbulli, et al [1], they define the school management system as a big database system, this can be used by school for supporting day to day activities in school. Information in here is data that has been given meaning by way of relational connection. This "meaning" can be useful, but does not have to be. In computer parlance a relational database makes information from the data stored within it [2]. And the system is a set of interrelated components, with a clearly defined boundary,

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working together to achieve a common set of objectives by accepting inputs and producing outputs in an organized transformation process [3]. Basically, ERP software is an innovative technology for better education [4]. With using the management information system that can help teachers and staff to planning, create the policy, and evaluation all the activities in school. Because we know that information technologies in educational institutes was mainly helping to manage student and academic data [5]

According to Hemmatfar, Salehi, & Bayat [6], with implementation of information system, it will help organization to get the competitive advantage by the contribution of this system to the strategic objective in organization to increase the productivity and performance. In this paper we try to analyze and design the model of web-based school management information system as a reference to help schools (management team) who want to develop information systems to minimize repeated and / or administration task while optimizing their efficiency in operations. And we hope by using the web-based school management information system, it will help to improve operational and educational services or methods while giving better services for all stake holder in school.

According to Satzinger, et al [7], when we analysis the system, we need to build documentations and models. The object-oriented analysis, we can use several models or diagrams to make the analysis more details, such as class diagrams, use case diagrams, activity diagrams, or even the sequence diagrams. And based on Rob [8], for the structured approach, normally we just used three models, but in the object-oriented approach there are about thirteen models, but in this paper, we just used several diagrams that is suitable to develop management information system for school. The first thing we do when designing an information system is by designing a modular building block with the bridging of application programming interface that enables additional plugins (including additional themes) on the top of our information system without changing the base source code. Second, authors will design efficient, easy to understand user interface. ERP software is an innovative technology for better education [9].

Many schools in Jakarta have not used the information system in their schools. We chose one of the schools to get the requirements of the business process running at this school (XYZ school), where this school will explicate their problem to be documented as a case study. School Management Information System is by automatically calculating the absence of data and turn them into a report, eliminating human error during the calculation process. There are basically two objectives in this research, among which are: (1) Analyzing the information system needs for schools; (2) Conduct system design in accordance with the needs of the school system in Indonesia by making observations to one of the schools.

2. METHODS

The methodologies that are used (see figure 1):

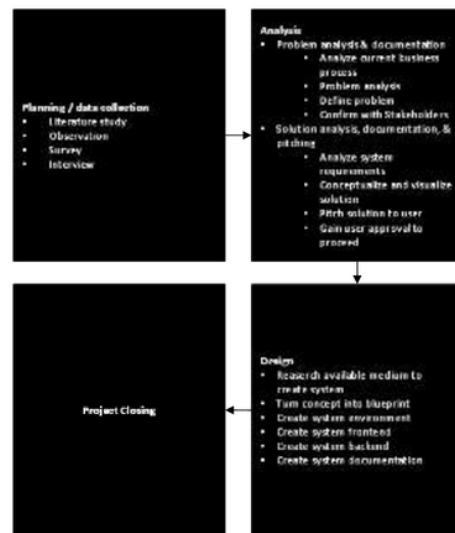


Figure 1 Research Framework

1 This research divided into four steps, that consisted: Gather the data related the problems during the planning step; and on the analysis step, we can analysis the problem and propose the solution; and on design step, we will design the system using Unified Modelling Language notation, that can help to communicate the ideas from our project (we using the iterative approach).

3. RESULTS AND DISCUSSION

Prior to the development of this information system, we conducted interviews, surveys, observations and literature studies to get the needs and analyze the problems that exist in the school. The designers and vendors of software need to consider the user needs in the design of information systems for school [10]. Based on the interview with the Headmaster, we have a conclusion that XYZ have several problems. For instance:

1. Headmaster is having difficulties to monitor daily school activities from the outside, for there is a vast amount of activities that need to be done by the headmaster from the outside, such as attending seminars, meeting with education authorities, conducting training for teachers, etc. This causes lack of control of the headmaster and increase headmaster's dependencies to the person in charge, whereas the person in charge could not be reached 24 hours. Thus, headmaster could not retrieve the information he/she wants whenever he/she wants.
2. Administrator requires a long time to finalize the schedule. This is caused by the headmaster and the curriculum vice principal are frequently having activities outside the school, for the schedule needs the approval from both the headmaster and the curriculum vice principal. This could cause the delay of the other paperwork needed to start a new semester.
3. A vast amount of time spent in counting attendance, documenting and calculating absence. In the other side, there is also a possibility of human error.
4. The lack of control in tuition payment. There are some cases where some students miss the tuition for months. This will result in occurring another problem while creating a financial projection for the future.

5. The lack of control in library. Some students could miss the deadline or even forget to return the borrowed book. This could cause the school library losing important part of learning, and it requires some times to replace the book, or in some cases, the book is not published anymore.
6. Some parents don't know the behavior of their child at school. XYZ school wants to ensure the parents know it all, therefore they could solve the problem together before it become severe.
7. Schools have to create their quarterly student report manually because Sistem Administrasi Sekolah (SAS), the government's information system, requires some time to generate student's academic report. Furthermore, the report is only generated every semester. Therefore, the schools have to generate the report manually and it takes days to finish the calculation and it is possible for the human errors to occur.

As solution to the problems faced by XYZ School, we will design web based information system that will enrich and aid XYZ School in their day to day school management activities. The system are composed of:

Table 1 Problem and Solution

Problem	Solution
Headmaster is having difficulties to monitor daily school activities from the outside, for there is a vast amount of activities that need to be done by the headmaster from the outside, such as attending seminars, meeting with education authorities, conducting training for teachers, etc. This causes lack of control of the headmaster from increase headmaster's dependencies to the person in charge, whereas the person in charge could not be reached 24 hours. Thus, headmaster could not retrieve the information he/she wants whenever he/she wants.	School dashboard and reports module: will show required data based on the request of the headmaster.
Administrator requires a long time to finalize the schedule. This is caused by the headmaster and the curriculum vice principal are frequently having activities outside the school, for the schedule needs the approval from both the headmaster and the curriculum vice principal. This could cause the delay of the other paperwork needed to start a new semester.	Scheduling module: to track and announce, and alter schedules with greater flexibility since it can be accessed everywhere and approval only requires few taps.
A vast amount of time spent in counting attendance, documenting and calculating absence. In the other side, there is also a possibility of human error.	Attendance module: to automatically track student's absence and show they real time.
The lack of control in tuition payment. There are some cases where some students miss the tuition for months. This will result in occurring another problem while creating a financial projection for the future.	Exam Card: it will help to monitor the student tuition fees and fines. So, the student can't print the exam card, if they are not doing the payment process, thus cannot participate in exam.
The lack of control in library. Some students could miss the deadline or even forget to return	The e-library module track all the people whom borrow the book, the title, along

Problem	Solution
the borrowed book. This could cause the school library losing important part of learning, and it requires some times to replace the book, or in some cases, the book is not published anymore.	with the payment for late book return period.
Some parents don't know the behavior of their child at school. This school wants to ensure the parents know it all, therefore they could solve the problem together before it become severe.	Point: It will help teacher and parent to monitor their students/kids development in school.
Schools have to create their quarterly student report manually because Sistem Administrasi Sekolah (SAS), the government's information system, requires some time to generate student's academic report. Furthermore, the report is only generated semesterly. Therefore, the schools have to generate the report manually and it takes days to finish the calculation and it is possible for the human errors to occur.	Progress report (term/semester): The system will automatically calculate all student grades, so the students and teachers can access the score online (real time), and it will reducing the time to produce the report and human error.

After analyzing the needs of existing information systems at the company, the next is to identify system features required by the school. One of the easiest steps is to create a use case diagram. The reason to create Use Case is to lists the process of interaction between system and user of each use case in narrative.

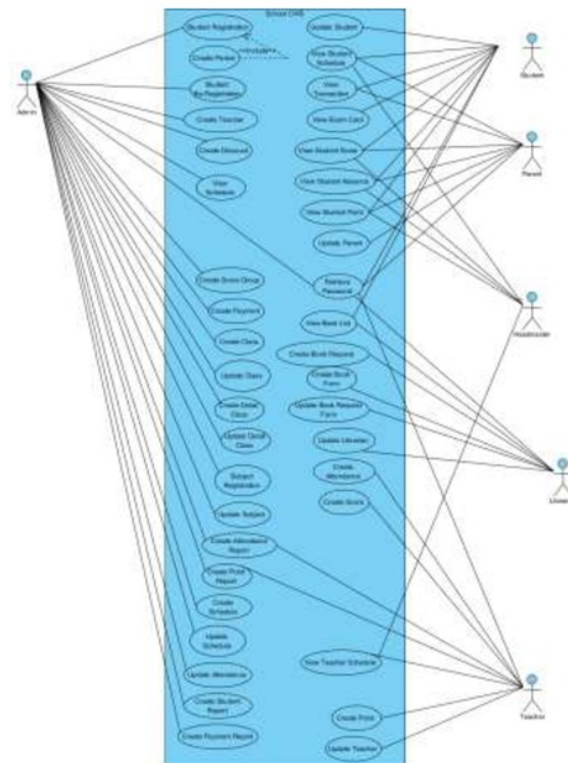


Figure 2 Use Case Diagram

Use case realization consists of first cut diagram, sequence diagram, multilayer diagram, communication diagram, updated class, and package diagram. This is the example diagram that we used for this research. Updated Diagram is being used to show the data flow between databases within the system.

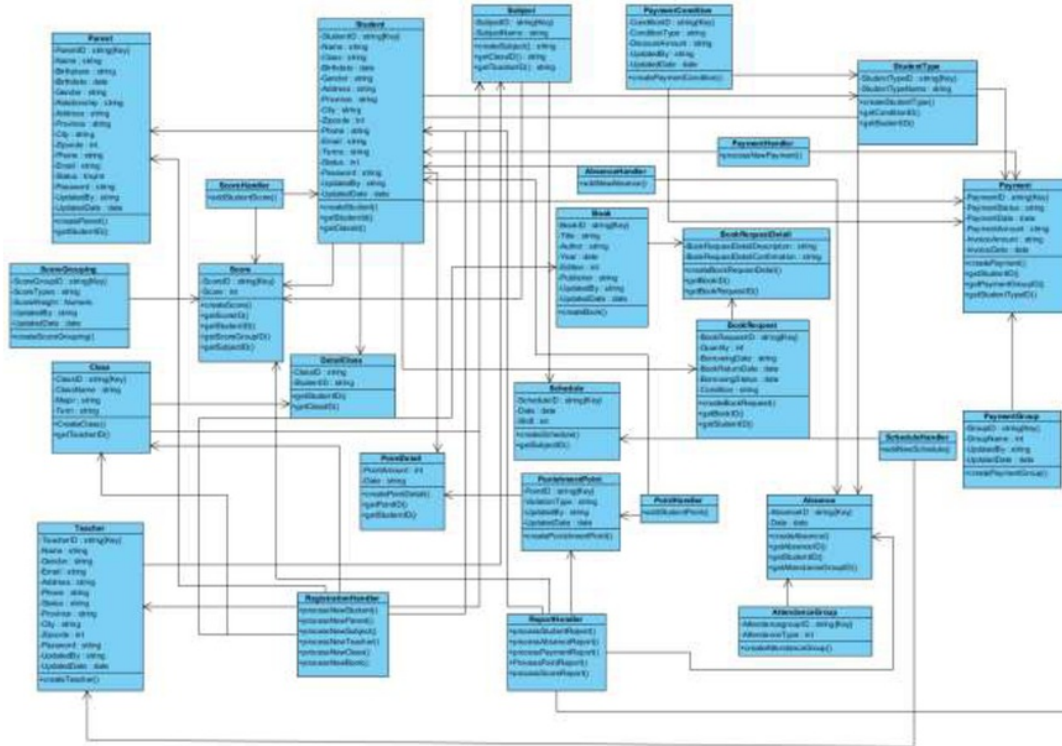


Figure 3 Class Diagram

After created the class diagram, we designed the package Diagram is being used to show which component belong to which layer. The package diagram helped us to identify all objects in the system, which we designed.



Figure 4 Package Diagram

And for database design of this e-learning system, we used the Entity Relationship Diagram as the predecessor of Class Diagram.

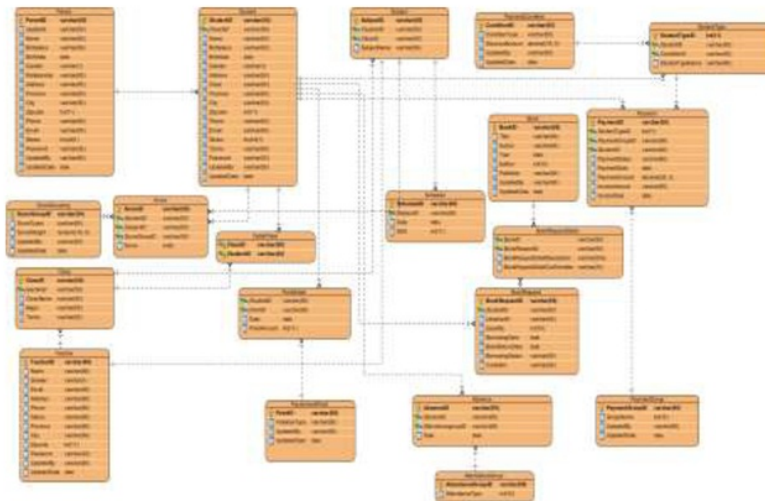


Figure 5 Entity Relationship Diagram (ERD)

After we created the database design using ERD, and next we need to create architecture of the system using deployment diagram. According to Satzinger, et al [11], we need to

develop deployment environment of the system that consisted of software, hardware, and network environment that support the system. Deployment diagram showed the technical things that support the operating of system.

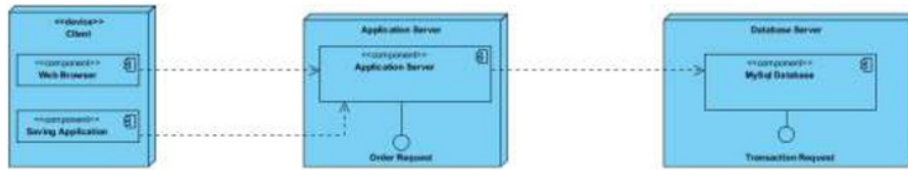


Figure 6 Deployment Diagram

After finished the deployment diagram and next we design the Integrity & Security Control diagram (Below)

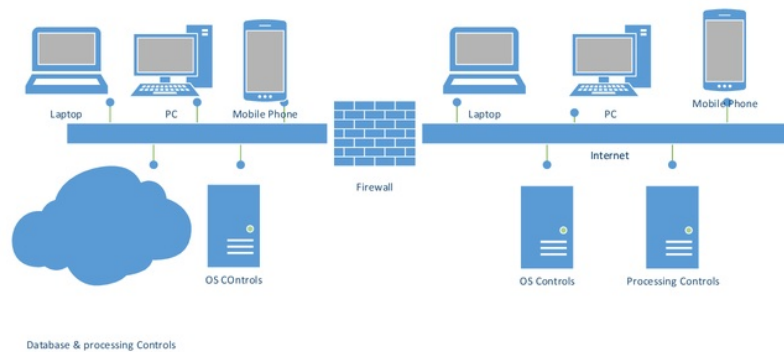


Figure 7 Integrity and Security Control Diagram

For the database and processing controls in the Internet, we suggest the organization to utilize Windows Azure Virtual Machine as infrastructure provider, and Windows Server as operating systems (if they have the budget for license).

3.1. Deployment Environment

Hardware Multitier: Deployment environment of *Web Based School Information System* from hardware side can be categorized as a multitier because the processes that are done in the transaction can be done in several computers that are divided into some roles such as user/customer and admin. Based on the hardware architecture type, multitier hardware on *Web Based School Information System* is:

3.1.1. Multicomputer Architecture

Because servers that are used to do the business process in *Web Based School Information System* doesn't have to have the same specification, so it will be okay if there is some differences between each server in *Web Based School Information System*.

3.1.2. Distributed Architecture

Because the overall implementation process of *Web Based School Information System* is not only located in one place.

3.1.3. Computer Network

Computer network that use to carry out the entire process in *Web Based School Information System* uses the WAN (Wide Area Network). Because *Web Based School Information System*'s application is web-based so that the application can be accessed from anywhere.

3.1.4. Software Architecture

3.1.4.1. Three-layer Architecture

Software architecture on *Web Based School Information System* is three-layer architecture. Because of the placement of the database and the application is put on a different server. There are 3 layers, first is User Interface Layer, Domain Layer and Data Access Layer.

3.2. Possible Problems from Project

- Readiness of users during the initial phase of system transition from semi manual to digitized.
- Difficulties in using system. Lack of feedbacks from the system, confusing terms, poorly designed color pallet, or too much of unused feature.
- Web page slow to load. The problem may occur on slow internet connection or mobile data access.
- Do not have time to open the system in the front of computer. Many people who use the system have highly dynamic activities in their daily lives too. When people are busy, sometimes things to do outside that routine goes unnoticed. One of them is the information served within the school management information system.
- Compatibility with browsers and/or mobile browsers.

For our User Interface design, we will use 8 golden rules as guidelines for user interface design. For color and simplicity, we will use Android design guideline. After we start to create the web page, we will divide the web page into smaller part and host our web in-house or West Jakarta to ensure connectivity. To ensure our web is accessible in highly dynamic activities, authors will provide mobile browser version too, optimized for touchscreens. Along with PDF documentation that always can be printed.

The figures below is some of example related the User Interface that we have.

4. CONCLUSION

In this research will produce models of Integrating school management information systems to be the basis of information system development for schools, where the school is expected to use the model of analysis and design of this system in order to create information systems that can accelerate the entire business processes that exist in schools, operational and academic matters. This model is possible to be used as the basis for development of school information systems in other countries, some things may be considered such as the use of Language as well as the operational and academic standards that may vary for each country.

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