Application Report Process Of Islamic School Based On Pesantren Boarding Using Waterfall Model

Tri Kustanti Rahayu, Susanto, Suwarjono
Department of Informatics, Faculty of Engineering, Musamus University
Merauke, Papua, Indonesia

tkrhayu@unmus.ac.id

Abstract. This research aims to develop information system applications for processing report evaluation of Islamic junior high schools based on boarding pesantren. Islamic junior high school based of boarding pesantren has different evaluation methods from junior high schools in general. Because Islamic junior high school based on boarding pesantren not only assess students academic abilities but also assess students religious abilities. This research uses waterfall method to build and develop software applications report process. There are 5 stages to be implemented such as communication, planning, modelling, construction, and development. In addition, it also uses Data Flow Diagrams to model the data flow that occurs in the system. The results is software applications that can combining report card from school with boarding pesantren.

1. Introduction
Information technology continues to be developed. Information technology has influenced all aspects in human life. It has brings many changes to human life. Many applications model with various platforms have been built. The applications are built with various functions and objectives. From office applications to home applications. From difficult application to process data until simple application to entertain user.

Developing application software without using methods takes a longer time and more complicated. It is because there is no guidance strategy or reference what to do in developing software. In addition, when an error occurs, the developer team becomes difficult searching and finding errors need to be fixed. In the contrary, developing software using methods giving many advantages like guidance strategy for each step. Each step will be directed intent and its purposes. And also the working time will also be more controllable, thus accelerating the completion of a software project.

Software application development methods have been developing for years. One of a classical method to building software project is Software Development Life Cycle (SDLC). One approach from SDLC model is waterfall model. The waterfall model is the most widely used model for software development. This old model is easy to be learned [1]. Software engineering is the application of a systematic, disciplined, quantifiable approach to development operation and maintenance of software [2].

In this study, waterfall model is used to build application report card process for Islamic junior high school. This school also integrated with a boarding pesantren for students. So student report card is combine between academic test grade in school and religious knowledge test grade from boarding
pesantren. Academic grade shows the results of learning achievement students for mastering subjects in school. This value is obtained through a series of tests such as midterms, final exams and some additional test. While religious knowledge shows the results of student learning outcomes in mastering some subject in boarding pesantren. This value is obtained through a series tests such as practical tests like memorizing Al Quran and its translation, memorizing prayers and prayers practicing. And Written tests like test of Islamic culture history, morality tests, and so on.

Developing software application for report process in this school is need to be done. First, this school has many students so there will be many data to be processed. Second, school still use calculator to count student test value to process report card so that calculation errors might be occurred. The third it takes a long time to process students report card manually. So it is necessary to build software that can process student report cards at this junior high school based on boarding pesantren.

2. Literature Review
Waterfall model has been implemented in many kinds of application [3][4][5][6]. Waterfall model is used to build large software. This research use case study at Ericson AB in Sweden to address common beliefs that waterfall model has defect on late to overcome changes, and also need a long time to finish the project. And the result is the most critical issues in waterfall development is related to requirements and verification. In consequence, waterfall model is not suitable to be used in large scale development [3]. Other research use waterfall model to estimate performance of a software project. This research use stochastic model to predict performance team in working time. The main contribution of this work is a conceptual model for the analysis of effectively working time in Waterfall software development context [4].

Research on the application report card process using waterfall model had been carried out by several researchers. Research conducted by Try Adrianto Darsono aims to provide an alternative provision of student value information through the web [5]. Other is Philip Hendra Wijaya conducted a similar study to build a final grade process system. This study aims to assist lecturers in providing assessments at the end of the semester and to recapitulate student attendance each semester [6].

3. Methodology
3.1. Software Development Life Cycle
Software is a set of instructions given to a computer so it can work and complete a particular job. Software is built with one specific purpose. So that when building a software, it is necessary to pay attention to each stage so the resulting software can cover user needs. Software Development Life Cycle (SDLC) is a life cycle in software development. SDLC helps developers improve the quality of the software produced. SDLC emphasizes user needs followed by a structured approach to building or developing new systems.

3.2. Waterfall Model
The waterfall model is one approach used in the System Development Life Cycle (SDLC). It has been widely used. This model was first introduced by Winston W. Royce in 1970. This model is known as the classic life cycle because it has been used for years. It also known as systematic and sequential model. This model phase begins with communication, planning, modelling, construction, and finally deployment phase as shown in Figure 2. This model is also said to be a rigid model, because each stage must be completely completed before proceeding to the next stage. Or in other words, the next stage cannot be started if the previous stage has not been completed. At the end of each stage a review will be carried out to ensure that the final results are in accordance with the specified targets. Then at the last stage, the user will be involved in conducting software testing and repairs so that projects can be made in accordance with user needs [2].
1. Communication, the initiation stage and determining the specifications of the user's initial needs. At this stage interviews, questions and answers used to gathering information including determining the project globally such as scope information, objectives, time, costs, and other important information.

2. Planning, estimating time to complete the project, and scheduling activities that can be done for project completion, and tracking system work.

3. Modeling, data structure design and software architecture. That is defining the relationship between tables, software algorithms, interface displays. This stage produces a more specific picture of software development.

4. Construction, this stage translates the design from previous stage into programming language. Then testing it, to find out if there are still any errors occurs and need to be fixed.

5. Deployment, this last stage involves users to ascertain whether the software is running according to user needs. This stage is also a refinement of software after going through a trial phase that still corrects deficiencies or errors. So that this enhanced software can be called a finished product and can be used in a real business environment. In addition, this stage also accommodates feedback from users for future software development.

3.3. Data Flow Diagram (DFD)
Data Flow Diagram (DFD) is a tool used to design the functional relationships of developing system. DFD describes the system through a data flowing from one part to another. DFD is the most commonly used tool for describing system data flow. DFD aims to make it easier to communicate system design to users and other developer or team.

DFD describes the data flow starting from input, process, until the output. DFD is described through a hierarchical relationship that contains a general system overview detailed to the most specific process. The hierarchy in the DFD is indicated by levelization. The first level (Level 0 or the Context Diagram) describes the system as a whole. The next level (Level 1, Level 2 and so on) is a sub-section or sub-process of the level 0 or the previous level [2].

3.4. Report Card Evaluation
Report card is a document relating between school and students and other parties who want to know the learning achievement of students in a certain period of time. Report cards must be communicative, informative, and comprehensive (comprehensive) to provide a clear picture of student learning achievements. Generally report cards are given by schools to students or parents of students twice to four times a year [7]

3.5. Academic Grade
Academic achievement is the result of learning evaluation of a process usually expressed in quantitative form (number) specially prepared for the evaluation process, such as lesson value, courses, exam scores and others [8].

3.6. Religious Grade
Religious education is an education that prepares students to be able to doing something based on religious understanding. And to be religious expert and implementing it [9]. The required test scores include practice exam scores and written exam scores.
4. Result and Discussion

4.1. Result

Information system application to process report cards is used to facilitate teachers processing grade of students. An overview process of evaluating student learning outcomes can be seen at the following flowchart. Figure 2 shows the flowchart of the report card value calculation process. Beginning with inputting competency data, attendance, daily test data, midterm score, final examination score. These data come from student activities at school. In addition, the pesantren attendance and test data is also inputted. Student pesantren test data comes from the activities of students in boarding pesantren schools. After that the data will be stored in the data storage or database. And than the process to calculate final grade students by taking data from the database. And finally the result calculation will be printed in the form of student report cards and semester reports.

The overall picture of the system can be seen in the following context diagram. Figure 3 shows that there are 4 entities involved with system, namely homeroom teacher, subject teacher, admin, and vice principal curriculum. Admin tasked to inputting school data, class data, lesson data, teacher data, student data, and other important data. Admin can access school data recap, class data, lesson data, teacher data, student data and more. The homeroom teacher enters data on activities at school and pesantren, including absences and test. In addition the homeroom teacher also input some competency values, extracurricular. Subject teachers input the competency and student grades. Deputy Head of the curriculum can access reports on student learning outcomes and student achievement.
The output results of the student report can be seen in the following picture 4. At the student report card, there are several menu choices that can be chosen by the homeroom teacher. Student report cards and boarding pesantren school grades can be printed into Microsoft Excel format. It has information about students' spiritual and social attitudes, student knowledge, student skills, student extracurricular values, and student attendance information. Besides that there is also a menu for printing student data in Pdf format.

4.2. Discussion
This study utilizes waterfall model to build software application to process report cards In waterfall model, user needs must be properly defined by the developer in the initial stages. This ensures the planning and flow of process stages before the project starts. But in terms of time, this model takes a
long time. This is because, other stages of the process cannot be started if certain stages have not been completely resolved.

5. Conclusion
After developing software application using waterfall model, there are some conclusion can be highlighted as follows:
1. Building report application to help teacher doing calculation process is very helpful. It can reduce mistakes during calculation process, and faster to process student’s report card.
2. Application can integrate between academic report and religious report.
3. Waterfall model implemented making software development process more focused and not time consuming.

References
[1] Kute, S. Suresh, Surabhi Deependra Thorat, 2014, A Review on Various Software Development Life Cycle (SDLC) Models, International Journal of Research in Computer and Communication Technology, Volume 3, July 2014
[2] Pressman Roger, 2005, Software Engineering: a Practitioner’s Approach. Seventh Edition, New York : McGraw-Hill
[3] Petersen Kai, et al., 2009, The Waterfall Model in Large-Scale Development, 10th International Conference, PROFES 2009, June 15-17 2009, Oulu, Finland
[4] Ildo Massitela, et al., 2018, A Structured Stochastic Model For Software Project Estimation In Waterfall Models, International Conference on Software Engineering and Knowledge Engineering (SEKE 2018) At San Francisco Bay, USA
[5] Adrianto Darsono Try, 2012. Sistem Informasi Pengolahan Nilai Siswa pada SMA YPPK Yos Sudarso Merauke Berbasis Web. Skripsi, Teknik Informatika, Fakultas teknik, Universitas Musamus, Merauke
[6] Wijaya Pillip Hendra, 2014. Sistem Pengolahan Nilai Akhir Semester Pada Fakultas Teknik Universitas Musamus Merauke. Skripsi, Sistem Informasi, Fakultas Teknik, Universitas Musamus, Merauke
[7] Departemen Pendidikan Nasional Direktorat Jendral Manajemen Dikdasmen Direktorat Pembinaan Sekolah Menengah Pertama, 2006, Petunjuk Pengolahan Rapor. Jakarta: Departemen Pendidikan Nasional
[8] Suryabrata Sumadi, 1993, Psikologi Pendidikan, PT. Raja Grafindo Persada, Jakarta
[9] __________, 2007, Peraturan Pemerintah Republik Indonesia Tentang Pendidikan Agama dan Pendidikan Keagamaan, Jakarta