

Designing and Developing a Mobile Academic Platform for University

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Abstract.

Academic consultation is a consultation activity between academic supervisors and students in the study and helps solve problems that accept students. The goal is that students who can complete their studies according to their interests and abilities. The implementation of academic consultation is regulated by each study program / faculty / university. The current academic guidance process at Multimedia Nusantara University does not control the students being guided. In addition, the current process of distributing student assistance is done manually by the head and vice of the study program. They divide the average number of students by the number of lecturers. With the random number algorithm, pseudo random number generator will help the division of students with automatic divide. The pseudo random number generator algorithm was chosen because it has the advantage of providing initial value of the process that is produced quickly, simply and saves storage. The design of this online academic consultation application will assist in the academic monitoring process anytime and anywhere. This application developed using flutter and can be use by students and supervisor. The result from this research was application successfully developed and received a score of 88 % for UEQ Questionare, which is categorized as excellent.

Keywords: Mobile Academic Platform, Pseudo Random Number generator and UEQ Questionare.

1. INTRODUCTION

Academic consultation is a consultation activity between academic supervisors and students in the study and helps solve problems that accept students. The goal is that students who can complete their studies according to their interests and abilities. The implementation of academic consultation is regulated by each study program / faculty / university. The academic consultation in the Informatics Department at Private University are given periodically 3 times minimum in one semester. Given the suggestion for the academic consultation one time each before mid-term, final-term, and course selection form. However, for the implementations be adapted with an agreement between the academic supervisors and students. Thus, the current process of academic consultation at Private University are unable to control the students, example the supervisors that does not have the history of each student that are assisted while the students only came for the consultation with their supervisors alas only notes that are given to them. Hence, the supervisor consultation forgot to save the copy of the consultation they gave. Then, supervisor consultation has a packed schedule on both inside and outside the university that is why many of them have a difficult time to do academic consultation with the students. Therefore, some of the supervisor even forgot the student's name that they have to open the private university's website to check it. Thus, the process 8 semesters of academic consultation caused tha academic book torn and missing so the students have to pay around Rp. 50.000 (fifty thousand rupiah) to get the new book meanwhile the consultation result data on the old book can not be returned. Based on the discovered problem found that the academic consultation processes are not the easiest thing to do [1].

However, the current process of distributing student assistance is done manually by the head and vice of the study program. They divide it equally based on the sum of students and supervisors, then the

supervisor who hold structural positions will be reduced and divided it equally hence added back to the supervisors who don't hold positions. Based on Republic of Indonesia Ministry of Education and Culture rules, the ideal number for one supervisor to hold students for academic consultations are 30 students [2]. Hence, the process of dividing the students will be using a random number algorithm. Pseudo Random Number Generator Algorithm or PRNG is an algorithm that uses mathematical formula to produce sequences of the random number, this algorithm generates a sequence of number approximating the properties of its random number. PRNG starts from an arbitrary starting state using a seed state meanwhile number are generated in a short of time that also can be reproduced later, if the starting point in the sequences is known. Therefore, the numbers are deterministic and efficient [3]. There are a few characteristics of PRNG which is efficient, deterministic and periodic that is why this algorithm is chosen due to its computation that gives a number in the beginning that can compute the result fast, simple and does not take much storage. In conclusion, in this research will be doing an application implementation of Online Academic Consultation Together using PRGN algorithm to help supervisors to control the activities of the students so the process of the consultation can be done anytime and anywhere without bringing the book and the consultation history.

II. METHODS

Software Development Life Cycle (SDLC)

In this research, Software Development Life Cycle (SDLC) will be used as the step of the research. SDLC itself is a structured process that used to design, develop, and test good-quality software. SDLC also is a methodology that defines the entire procedure of software development step-by-step. The goal of SDLC life cycle model is to deliver high-quality, maintainable software that meets the user's requirements. Thus, in software engineering models, the outline of the plan for each stages of the software development model able to perform its task efficiently to deliver the software at a low cost within a given time frame that meets user's requirements. Software Development Life Cycle consists of a precise plan that describes how to develop, maintain, replace, and enhance specific software meanwhile the life cycle defines a method for improving its quality of the software and all-around the development processes [4]. However, it is required to choose the right SDLC methodology according to the specific concerns and requirements of the project to ensure its success [5]. Thus, there are a several advantages of software development life cycle which is the efficient with structured approach to software development, risk management to identify effectively manage risk inherent in the software development processes, consistency, collaboration and lastly cost-effective.[6]. The step of SDLC chart can be seen in Figure 1.

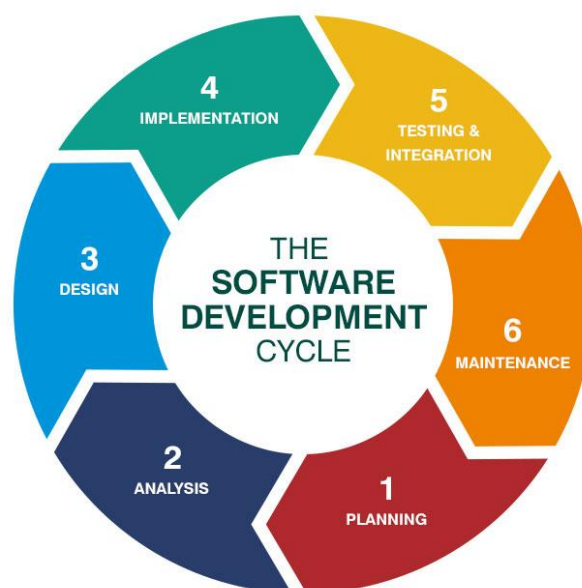


Fig. 1. SDLC Steps

Based on Figure 1 above, the SDLC steps in this research has purpose to create a framework systematically that also includes a research code of ethics[7]. There are a few steps in this research which are:

1. Planning, this research will start by planning of creating the application, calculate time and effort estimation that are needed for the development processes.
2. Analysis, after we have finished the planning for development feature in the software. The output from feature and business purpose will generate Functional Specification Document (FSD) or Business Requirement (BR).
3. Design, is the next progress after analysing. The output from this step is to create a flowchart or site map, database schema, mock up, and application prototype.
4. Implementation, based on design step above, in this step will start by doing coding. The application will build using Android while the website administration will be held for dividing the student processes.
5. Testing and integration, this step will be done once all the features have successfully developed that also need to do an testing with schedules scene. If this step is finish the next step will be integrated so the students and supervisors can use it.
6. Maintenance, this final step will be the most important because the feature that already implemented must be maintained for more development on the next feature.

Pseudo Random Number Generator (PRNG)

Pseudo Random Number Generator (PRNG) is known as a deterministic bit generator (DRGB) which is an algorithm for generating a sequence of numbers whose properties approximate its properties of sequences of its random numbers. The PRNG create a sequence that is not truly random since it is completely determined by an initial value called the PRNG's seed (which may include truly random values). A seed is a number that use to initialize a pseudo random number generator while it does not need to be random, this number can come from randomness of noise or the current time in miliseconds. However, the pseudo random sequence must eventually repeat with the same seed because this occurs when an algorithm reaches a seed that has previously used then the cycle repeats. Hence, there is a length before a pseudo random sequence repeat itseld called the period. This period strictly limited by the length of the initial seed. For example, when the middle squares algorithm and a two-digit seed is used the algorithm will able to generate at most 100 numbers before resuing a seed and repeating the cycle [8]. A pseudo random generator produces a series of pseudorandom numbers, given an initial seed X_0 and integer parameters a as the multiplier while b as the increment, and m as the modulus. This generator is defined by the linear relation between $X_n \equiv (aX_{n-1} + b) \bmod m$ [9]. Additionally, there are applications for PRNGs such as in gaming where PRNG can be used in video games, simulations and modeling, statistical sampling and lastly procedural content generation [10].

Application Architecture

Application Architecture can be use to show the process between the component design that interact each other. This application architecture able to help implementing a software. The structure of this application architecture can be seen on Figure 2.

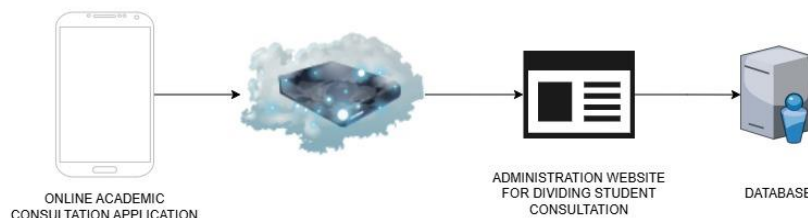


Fig. 2. Application Architecture

Based on Figure 2. Application Architecture, the application will be implemented using mobile Android based. Thus, server of the application and the dataset will be build in Cloud meanwhile the current process for dividing students that are divided by the head and vice study program will use website. In addition, every user are able to d o job easily because user will not using paper and dividing students will be done automatically by system using LGC Algorithm.

Online Academic Consultation Application

Based on Application Architecture explanation above, gained the following flowchart for the online academic consultation application. The flowchart of the application can be seen on Figure 3.

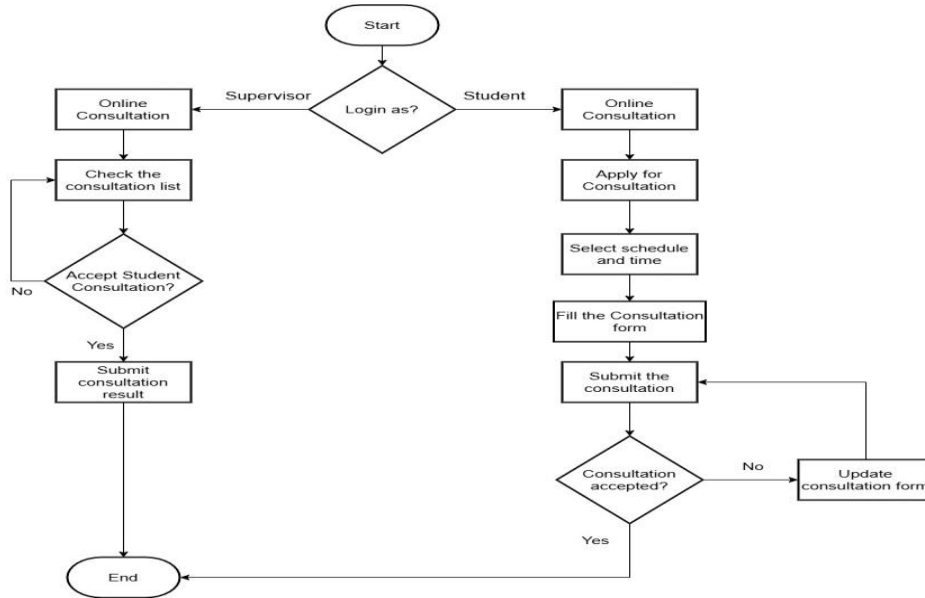


Fig. 3. Online Academic Consultation Application Flowchart

Based on the Figure 3 above, the flowchart application of online academic consultation starts by login to the application. The login has two role which is student and supervisor. If the user login as student then the application will lead the user to the home page to select the online consultation, continue after that the student must apply for consultation to their supervisor with the following feature to select schedule and time to fill the consultation form. Therefore, once the consultation has been submitted the student has to wait for the consultation to be approved or accepted if the consultation is not accepted then the student has update the consultation form to resubmit it until the consultation is accepted[11].

In addition, when the user login as supervisor the first step to do is to check on the consultation list to see if there is a student apply for online consultation. Hence, if there is at least one applied consultation from the student then the supervisor must check first before accpeting. However, the supervisor can reject the consultation if it does not meet the requirement yet also can accept to submit the result of the consultation[12]. Thus, the use case of Online Academic Consultation Application can be seen on Figure 4.

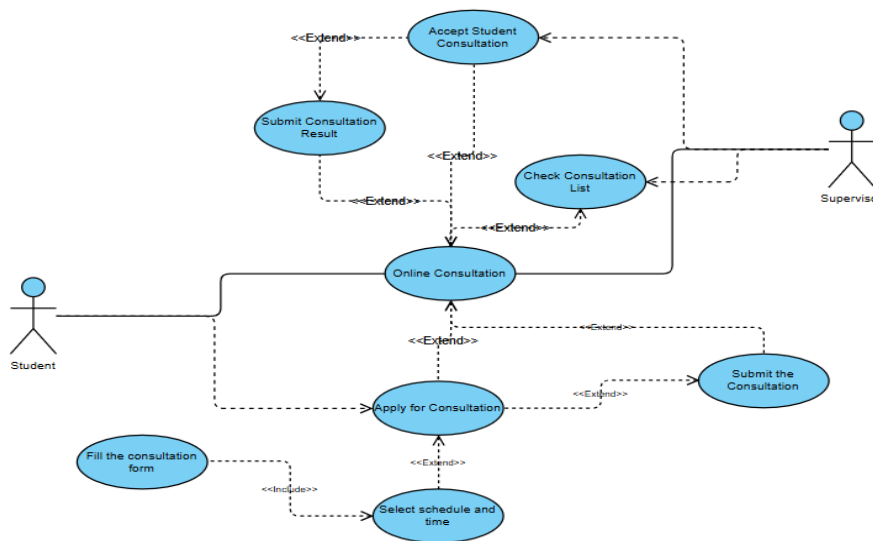


Fig. 4. Online Academic Consultation Application Use Case

Based on Figure 4 above the use case of Online Academic Consultation Application can be seen. The following explanations can be follows below:

1. Online Consultation: online consultation is a homepage from online academic consultation application that can be accessed by student and supervisor
2. Student: a student is a user that can access or use the application, starts from applying for consultation follow by select the schedule and time to fill the consultation form until the student can submit the consultation.
3. Supervisor: a supervisor is a user that can access or use the application with the following role as a supervisor. The supervisor can check the consultation list to check if there is an applied consultation. The supervisor able to reject or accept the applied consultation and able to submit the consultation result if the consultation is accepted[13].

III. RESULT AND DISCUSSION

Within the implementation of the application, the application is build using Android with the login role are students and supervisor. The result of the application can be seen in Figure 5.

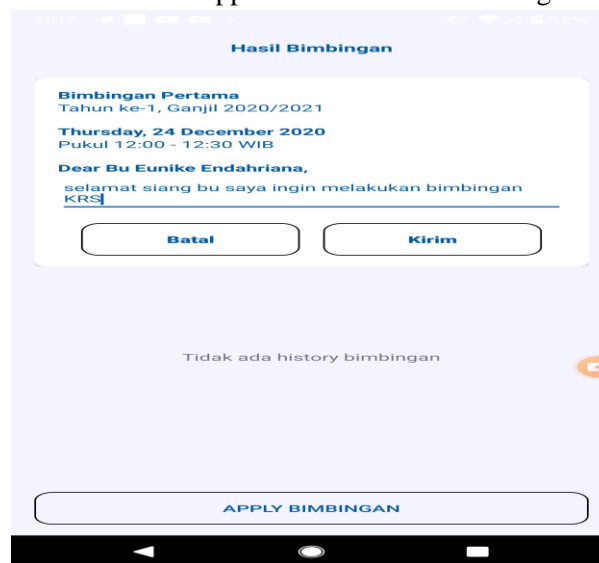


Fig. 5. Applying Consultation Homepage

Based from Figure 5 above, the student able to apply online consultation by filling the consultation form such as selecting schedule and time and the purpose of consultation when the student finished filling the form, then next step is to submit the form and wait until it got approved. Thus, when the user login as supervisor able to either accept or reject the applied consultation. The result can be seen in Figure 6 as follows.



Fig. 6. Supervisor Approval page

The figure above explains that every supervisor able to either accept or reject the applied consultation by students. However, when the applied consultation get rejected the student must update the consultation form to resubmit the consultation for approval again. The result of rejected applied consultation can be seen by the following figure 7.



Fig. 7. Resubmitting consultation page

Based from the Figure 7 above, it explains that the applied consultation has been rejected by the supervisor shown that it has red dot on the top right corner. Thus, the student must update the consultation in order to be able do online consultation with the supervisor. In addition, to accept the applied consultation the supervisor must attached official signature, shown in Figure 8 below.

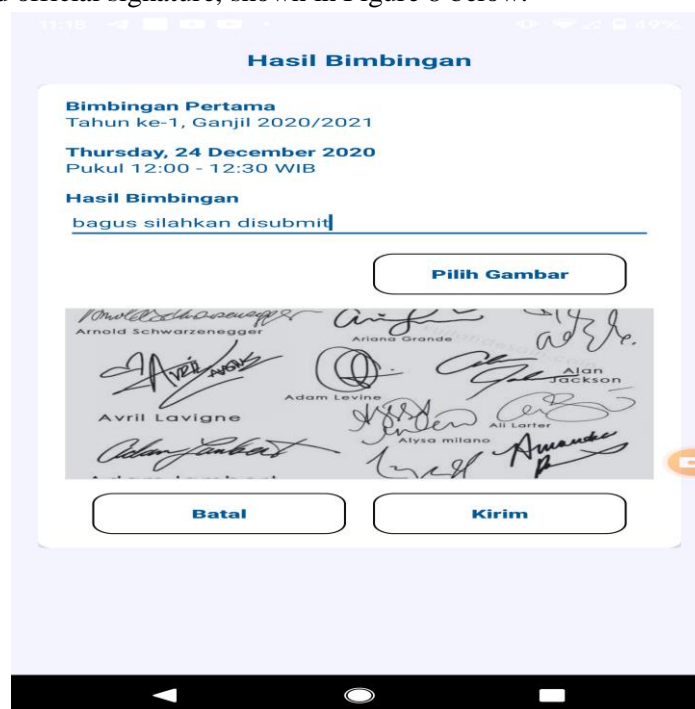


Fig. 8. Signature Attachment page

The figure above explain that the supervisor must attach the official signature in order to approve the applied consultation. In addition, the supervisor also able to give an additional notes for the student to see followed by attaching the official signature before submitting.

IV. CONCLUSION

Based on the research conducted, the following conclusions were drawn:

1. Mobile academic platform in Univeristy has successfully developed. This mobile application using random number generator to assign the student to the supervisor.
2. Testing and evaluation of the system were carried out by distributing a questionnaire, based on the USE Questionnaire method, to 31 respondents. The results showed a usefulness score of 86.5%, ease of use score of 87.3%, ease of learning score of 88.7%, and a satisfaction score of 87.7%. Overall, the system received a score of 88 %, which is categorized as excelente.

V. ACKNOWLEDGMENTS

I would like to express my sincere. This work would not have been possible without the academic environment and opportunities provided by Multimedia Nusnatara University.

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