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Development of XYZ University's Student Admission Site Using Waterfall Method

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ABSTRACT

The purpose for this research is to make a blueprint of State University Of Jakarta website for admission of new students. This site using RestFul API Web Service technology that split in between data processing logic system and user interface so that if the system are in development, developer no need to rebuild or reorganize the whole part of system. The research done at Information and Technology Center (PUSTIKOM) University of XYZ on February until May 2016. Developing method that used are software method development. i.e. spiral development method. Overall there's 3 main stages of this research and development. There are (1) early research; (2) product development; (3) test and revision of the product. Early research done for identify the problem and search the easy solution for solve that matter. Testing process for the prototype of the product done with media expert test. Data collecting process done by using questionaire which then analyzed with desciptive and quantitative technique. Based on research, testing result show that prototype have 100% score on Validation Test. Based the test result, the blueprint of University Of XYZ website for admission of new students that have been developed declared eglible for use as a milestone of admission of new students system for University of XYZ in a next year.

1. Introduction

The university is a higher education and research institution, which awards academic degrees in a variety of fields. Universities have several functions, as stated in Law No.12 of 2012 Article 4 that higher education has 3 (three) functions as follows:

a. Developing abilities and shaping the character and civilization of the nation with dignity in the framework of the intellectual life of the nation.
b. Developing innovative, responsive, creative, skilled, competitive, and cooperative Academics through the implementation of the Tridarma, and
c. Developing Science and Technology by paying attention to and determining the value of the Humanities. To achieve this goal, maximum effort is needed, one of which is to find the best prospective students.

XYZ University as a public university located in the capital city of Jakarta can make this happen, by paying attention to two factors that influence it. The first factor is the number of registrants. A large number of applicants at a university tightens the selection process for new student admissions. A strict selection allows the best students to be selected. XYZ University as a state university follows central government regulations in the selection of new student admissions including SNMPTN, SBMPTN, and Independent Selection. In this case, XYZ University has a new student admission with the Independent Selection path named Penmaba XYZ University. The second factor that plays an important role is an efficient selection registration process. This factor is a supporter of the first factor because implementing an efficient selection registration process it will make it easier for prospective applicants to register for self-selection at XYZ University. In the implementation process, the registration of XYZ University Penmaba is carried out online which aims to make it easier for prospective applicants to register so that the scope of registration will be wider and not limited by space. To support these two factors, an efficient student registration system is needed and is expected to simplify the registration process. A website-based information system in its use is proven to be an effective and efficient information system that can be accessed by anyone [1], anytime and

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anywhere. Website-based information systems have a very large effect on the development of information systems [2]. From anywhere, users can use an integrated information system [3]. Users can save time and money because from anywhere the user can run the system and can make decisions quickly. Website-based information systems can simplify the process of integrating information systems without being limited by time and space [4]. XYZ University is a higher education institution that uses a website-based registration information system as a new student registration system. XYZ University has developed a website-based registration information system, including in 2012, 2014, and 2015. In the early years of system development, the Penamaba website still had shortcomings in terms of server capabilities so that the system could not run properly and correctly. In its journey, it experiences various kinds of obstacles, and each year it changes, although of the changes there are still quite a lot of the same things. All changes cannot be carried out on time because the information required must go through several stages including having to wait for the decree from the government 3 months before the implementation of Penmaba XYZ University and having to go through a series of internal meetings within the campus. Therefore, a conceptual design is needed so that it can be used as a benchmark in designing the New Student Admissions (Penmaba) registration site [5]. This system can be more efficient in terms of server usage and development so that it is effective in integrating and developing the next system. And it can facilitate the development of systems that have often experienced obstacles in obtaining incoming information, such as registration procedures, required data, and system support information. Based on these problems, and ordered and systematic method is needed to facilitate the development of a system that is continuously being developed. The waterfall method is a method in developing software that is carried out in an orderly and systematic manner so that the information system development process will be more focused [6]. The waterfall method has been used in the development of website-based systems such as those developed by [7] [8] [9] [10]. Based on the above problems and considering the progress of website-based information system technology, in this study, the authors developed a website-based conceptual website for New Student Admissions (Penmaba) registration.

2. Theoritical Review

2.1. Waterfall Method

The waterfall method is one type of application development model and is included in the classic life cycle, which emphasizes sequential and systematic phases. For the development model, it is analogous to a waterfall, where each stage is carried out sequentially from top to bottom [6]. So, for each stage should not be done simultaneously. Thus, the difference between the waterfall method and the agile method lies in the SDLC stage. This model also includes software development that is somewhat less iterative and flexible. Because, a process that leads in one direction is like a waterfall. then enter into a discussion about the stages of the waterfall method [7].

a. Requirements The first stage of the waterfall method is to prepare and analyze the needs of the software to be done. The information and insights obtained can be in the form of interviews, surveys, literature studies, observations, and discussions.
b. Design The next stage is making an application design before entering the coding process. The purpose of this stage is to have a clear picture of the appearance and interface of the software which will then be executed by the programmer team.
c. Implementation The next stage of the waterfall method is the implementation of program code using various tools and programming languages according to the needs of the team and company. So, at this implementation stage it focuses more on technical matters, where the results of the software design will be translated into a programming language through a team of programmers or developers.
d. Integration & Testing The fourth stage is entering into the process of system integration and testing. At this stage, the modules that were created in the previous stage will be merged. After the system integration process has been completed, the next step is module testing.
e. Operation & Maintenance The last stage of the waterfall method is the operation and improvement of the application. After testing the system, it will enter the product stage and use of the software by the user. For the maintenance process, it allows developers to make improvements to errors found in the application after being used by the user.

The Waterfall method has been widely used in the development of website-based information systems including [7], [8], [9], [10]. In this research, we use the Waterfall method in the development of Information Systems.

2.2. Webservice RESTful API

REST (Representational State Transfer) is a general architecture used in Web Service development because it is based on HTTP to communicate over a network either connected via the internet or locally. The

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REST architecture is based on client-server communication, where the client requests a set of available data from a web service. RESTful Web Service or also known as RESTful Web API is a type of web service that is implemented using HTTP links using REST principles. The services used by the Client web use HTTP's proprietary methods, including GET, PUT, POST, and DELETE to communicate with the web service and the reply sent is a simple XML form without any data packaging protocols, so the information received is easier to read and parsed on the side client. For users, the GET, POST, PUT, or DELETE methods can be adjusted according to their needs. RESTful API has been widely used in website development, both in terms of accessing content as well as in terms of web security, as for research using the RESTful API including [11], [12], and [13]. In this research, we make use of the RESTful API for the system integration process and data communication intermediaries between different systems.

2.3. JSON

JSON (JavaScript Object Notation) is a computer data exchange format that is lightweight, easy to read and write by humans, and is easily translated and created by a computer. JSON uses the C family of programming languages, such as C, C ++, Java, Python. JSON is made of two universal data structures all modern programming languages support these data structures in the same or different forms. In this research, JSON is used for the data delivery framework.

3. Methodology

3.1. Research Methodology

The research method used in this research is the method of research and development (Research & Development or R&D). The R&D method is a research method that refers to the efforts required to create a product and test the product's effectiveness. After adjusting to the needs of the application, the stages of the R&D method applied in this research are:

a. Identify the problem.
b. Collect data.
c. Develop a product prototype (Design).
d. Validating the product prototype
e. Revise the product prototype

The purpose of this research is to create a conceptual site for the registration of XYZ University New Student Naming (Penmaba) which can be used as a benchmark in the design of the next New Student Admission (Penmaba) registration site.

3.2. Web Development Method

The web development method is a series of steps taken to develop a product. In this development research, the development method used is the software development method, namely the waterfall development method.

4. Research Result and Discussion

4.1. Development Outcome

There are two websites developed including a website developed for users (prospective students) in carrying out the registration process, payment to see the results of university admission selection. Where the information system on this website is integrated with web services provided by bank partners so that the payment process made by prospective students to the bank can be integrated with the website information system. As for some of the user interfaces of the user system as depicted in Fig 1.

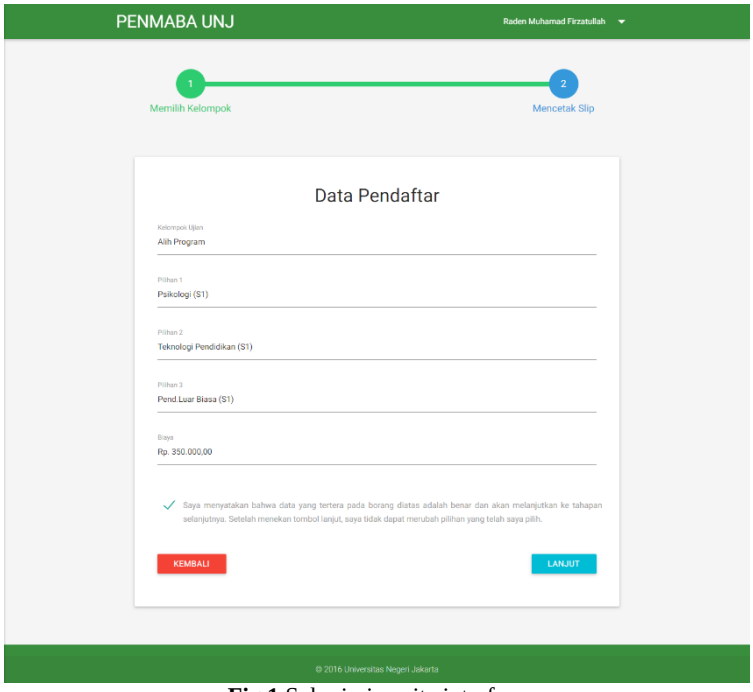

Fig 1 Submission site interface

In addition, there are several features that we have added on the registration website, including a photo editing feature, so that users can customize photos to be uploaded, as well as a payment slip printing feature to the bank as depicted in Fig 2 and 3.

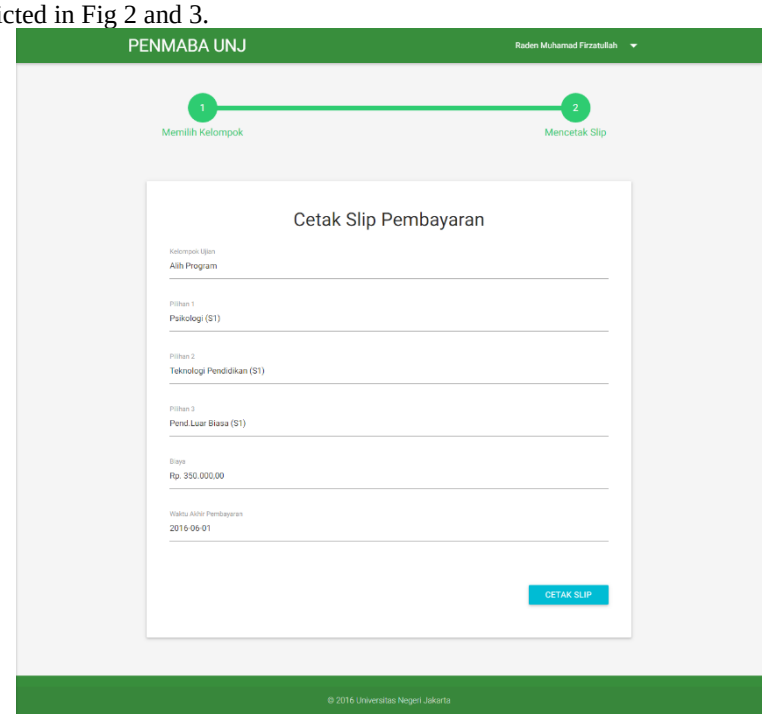

Fig 2 Print payment sli

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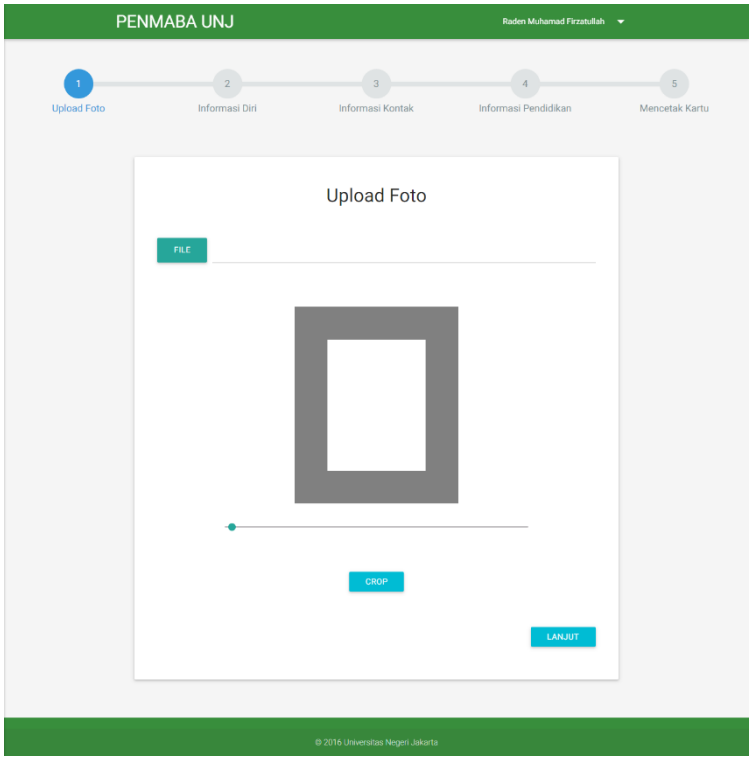

Fig 3 Photo editing feature

We have tested the functionality of the features of the website that we developed using the blackbox testing process carried out by the development team and as a result, we found no errors or bugs in the system.

4.2. Product Eligibility Testing

After the prototype and system are successfully developed, the next step is to test the prototype. The test carried out is a functional test to find out and see whether all the features contained on the site can run and function as expected. This test is carried out by the developer himself, two students, and an expert who can develop the site. Testing starts from the beginning, namely when registering, opening the login page, registration page, and printing participant identification cards. The result is that all the features on the site can function properly. The assessment instrument for the feasibility of the system that we provide to examiners is as shown in Table 1.

Table 1
The Assessment Instrument

No	Website Feature	Process	Response	Result
1.	Feature 1	Feature process 1	Response process 1	Error/Working/Bug
2.	Feature 2	Feature process 2	Response process 2	Error/Working/Bug
…	…	…	…	…

4.3. Product Assesment

After conducting the test, we process the test result data by experts and users. The calculation results from our test data are shown in Table 2.

Table 2
The assessment instrument

No	Aspek Penilaian	Skor Didapat	Skor Diharapkan	Kelayakan
1.	Rekayasa Perangkat Lunak	8	8	100%
2.	Komunikasi	5	5	100%
	Total	100%	100%	**100%**

The site development process is carried out using the waterfall development method which in general includes design, analysis, design, implementation, and functional testing. After the status prototype is successfully designed, a functionality test is carried out to see the performance of the functions made whether they are working as expected or not. From the test results, it can be seen that the test results are by the design of the functional requirements of the system and the display system. Then it can be ascertained that the functional testing of the system is fully working as expected by the developer. After carrying out the

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functionality test process, the validity test was carried out. Based on the results of the validity test conducted by media experts, the prototype of the developed site received a score of 100%. By the scale of the presentation in the table, the conceptual site for the registration of XYZ University New Student Admissions is included in the appropriate category to be used as a benchmark for developing the XYZ University Penmaba system in the following year.

5. Conclusion

Based on the results of preliminary research, the results of product development, the results of testing and product revisions as well as the discussion previously described, the following conclusions can be drawn:

a. The result of this development research is a product, namely the conceptual site for the registration of XYZ University New Student Admissions.
b. The process of developing the XYZ University New Student Admissions conceptual website is carried out using the R&D research method combined with the spiral software development method.
c. The conceptual site for the registration of XYZ University New Student Admissions that was developed has been tested and based on the test results it is declared fit to be used as a benchmark for the development of the XYZ University New Student Admissions registration system in the following year.

6. References

Journal Article

[1] Barnes, S. J., & Vidgen, R. T. (2006). Data triangulation and web quality metrics: A case study in e-government. Information & Management, 43(6), 767-777.
[2] Santoso, S., Kauf, J., & Aristo, N. C. (2019). The Information System of Name Card Sales Based on Digital Marketing to Improve Creativepreneur on College E-Commerce Website. Aptisi Transactions On Technopreneurship (ATT), 1(1), 64-72.
[3] Tirmizi, S. H., Sequeda, J., & Miranker, D. (2008, September). Translating sql applications to the semantic web. In International Conference on Database and Expert Systems Applications (pp. 450-464). Springer, Berlin, Heidelberg.
[4] Taddeo, C., & Barnes, A. (2016). The school website: Facilitating communication engagement and learning. British Journal of Educational Technology, 47(2), 421-436.
[5] Susilo, M. (2018). Rancang Bangun Website Toko Online Menggunakan Metode Waterfall. InfoTekJar: Jurnal Nasional Informatika dan Teknologi Jaringan, 2(2), 98-105.
[6] Lesmono, I. D. (2018). Rancang Bangun Sistem Informasi Penjualan Sepatu Berbasis Website Dengan Metode Waterfall. Swabumi, 6(1), 55-62.
[7] Hidayat, R., Marlina, S., & Utami, L. D. (2017). Perancangan Sistem Informasi Penjualan Barang Handmade Berbasis Website Dengan Metode Waterfall. Simnasiptek 2017, 1(1), 175-183.
[8] Yuniva, I., Andriansah, A., & Maulina, D. J. (2018). Perancangan Sistem Informasi Penjualan Produk Hasil Daur Ulang Sampah Berbasis Website Dengan Pendekatan Metode Waterfall. Jurnal Media Informatika Budidarma, 2(4), 174-180.
[9] Rahmayu, M. (2016). Rancang Bangun Sistem Informasi Pada Rumah Sakit Dengan Layanan Intranet Menggunakan Metode Waterfall. EVOLUSI: Jurnal Sains dan Manajemen, 4(2).
[10] Wulandari, D. A., Sari, A. O., & Astrilyana, A. (2019). Rancang Bangun Aplikasi Perpustakaan Sekolah Berbasis Website. JITK (Jurnal Ilmu Pengetahuan Dan Teknologi Komputer), 4(2), 163-168.
[11] Nguyen, T. (2016). Web Security: Security Methodology for Integrated Website using RESTful Web Services (Master's thesis).
[12] Miller, M. A., Schwartz, T., Pickett, B. E., He, S., Klem, E. B., Scheuermann, R. H., ... & O'Leary, M. A. (2015). A RESTful API for access to phylogenetic tools via the CIPRES science gateway. Evolutionary Bioinformatics, 11, EBO-S21501.
[13] Hong, X. J., Yang, H. S., & Kim, Y. H. (2018, October). Performance analysis of RESTful API and RabbitMQ for microservice web application. In 2018 International Conference on Information and Communication Technology Convergence (ICTC) (pp. 257-259). IEEE.