

Integrated Information System Model Development in Manado State Polytechnic

Maryke Alelo, Marike Kondojo^a, Shane Pangemanan, Muhammad Bakary and Maksy Sendiang
Manado State Polytechnic, Jl.Raya Politeknik Ds. Buha, Kairagi, Manado, Indonesia

Keywords: Academic, Integration, RUP, Lecturers, Students.

Abstract: An integrated academic document information system is a system to process data and academic information for academic community purposes. These research objectives are to build an integrated educational documents software for all divisions in the Manado State Polytechnic to obtain documentation and data synchronization. This software uses the Rational Unified Process (RUP) method with analysis using data flow diagrams and ERD. The results of this research are documentation and synchronization of data on academic documents that will present information in real-time. This software has been tested on 144 users that contain 109 lecturers and 35 students. The results of user trials show that the developed integration system can help users file academic documents, so it is beneficial for lecturers to make performance reports and manage ranks and accreditation activities. This is an essential requirement in improving the quality of academic services.

1 INTRODUCTION

The role of Information and Communication Technology (ICT) in the era of globalization has a strategic. Part because it is very influential for the advancement of technology in education. By mastering technology, we have the capital to develop all forms of existing resources. The application of technology and information in carrying out organizational management is significant in achieving the vision and mission that has been set, including in the higher education environment (Anggrainingsih, R., et al., 2012). Building and developing a quality application that can answer needs is not accessible because it must answer all the problems an organization faces. This research is one part of the research developed for BAN-PT accreditation and to complement BKD. What will build the information system to document all data related to academic activities in this current semester (even 2019/2020) as part of the related unit evaluation component. Educational documents have high use value and are very useful. However, the current system is not well documented and fragmented (not yet processed in one data repository). Even though Polimdo has facilities that allow data integration to be

carried out, it has not been utilized properly. This causes it to be inefficient in obtaining the information needed due to the long time it takes to search for the data/information required.


Polimdo already has an academic information system. However, the system is built separately with different accounts in each application, and there are still several features that must adjust in line with the new policy. For this reason, it is necessary to make adjustments to academic conditions so that the system owned by Polimdo can inform data in real-time and is up to date and integrated to make it easier for users to use the service.

The increasing public interest in entrusting their children to be educated at Polimdo must be accompanied by an increase in the quality of services, both infrastructure, facilities, infrastructure, and human resources.

2 LITERATURE REVIEW

2.1 Information System

According to (Laudon., K.C. and Laudon, J. P., 2004) technically information is, as a collection interrelated

^a <https://orcid.org/0000-0001-6309-0398>

component, which collect, process, store and distribute information to support decision making, coordination, and control. Information means data that has been arranged in such a way which is meaningful and useful. On the contrary, data is a fact which is still "raw" which represents events that are occurs in the organization or physical environment before it is organized into an information. Three activities in system information produce the information the organization needs to make decisions, control operations, analyze problems, and create new applications or services. Three activities are inputs, processes, and outputs. Input capture or converting raw input into a more form means. Output transfers processed information to people who will use it or on that activity where that activity will use the information in question. Information systems also require feedback, where output is returned to members of specific organizations to help evaluate or correct input.

2.2 Integrated Information System

According to Sinambela (2011) the definition of an integrated information system is: a technology platform that allows organizations to integrate and coordinate their business processes, the characteristic of an Integrated Information System is a high level of integration to accommodate the needs for integrated data/information (Idris, I., Napitupulu, H., & Matondang, N., 2018).

3 RESEARCH METHOD

According to Sugiyono (2016: 2) the research method is basically scientific way to obtain data for specific purposes and uses. Data obtained from research can be used to understand, solve and anticipate a problem.

3.1 Research Approaches and Concepts

Use multiple reference articles, e-books, and other sources as appropriate with research concepts that can be accessed on the internet, to get solutions to integrated system problems. The integrated system model can be explained in fig 1.

3.2 Rational Unified Process (RUP)

According to Jogiyanto, 2005 has four phases in sequential and iterative process where each iteration

can be used to improve the next iteration (Jogiyanto, 2005; Kondo, M. A., & Langi, H. S., n.d.).

1. Inception (preliminary) is the stage to model the system to be developed and to determine the requirements of the system to be proposed.
2. Elaboration (extension/planning) is the stage of planning the desired system architecture as needed.
3. Construction is the stage which is more focused on the component development of system or system features.
4. Transition is the stage is to how elaborate the system design by the deployment or system installation in order to be users friendly.

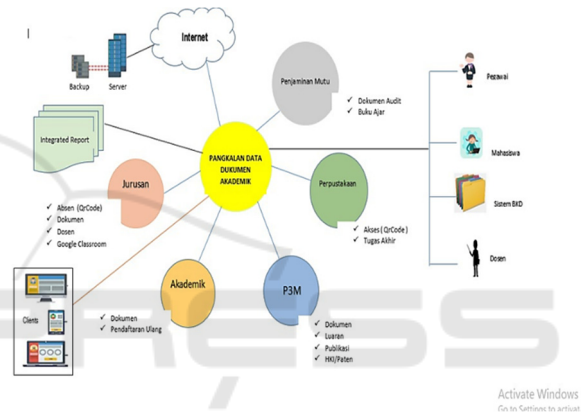


Figure 1: Integrated System Model Design.

4 DISCUSSION RESULT

4.1 Participants

To get maximum results from the development of an integrated information system, it is necessary to do some sample data on the needs of potential users. There are 109 lecturers and 35 students in all majors who are made respondents to the system test. System tests were carried out for seven days, either face-to-face or online using the zoom application, then lecturers and students provided an assessment of the application.

Data collection is one of the important stages in the development of an integrated system. Data collection is needed to obtain complete information about the model to be developed (Kahar, N., 2013). In the research the methods developed are: observation, interviews and questionnaires.

Polimdo has 29 has websites and application links. Unfortunately, this condition causes many academicians not to know the services available. That is because there are several applications developed which are the result of research by lecturers and students. For example, the web for each department is separate; to access it, each lecturer and student only knows the web link from their department.

Based on the above conditions, a system is needed that can integrate all running applications and web services in order to improve the quality of integrated services so that all users can access each several service / application with one account / Single-sign-on (SSO) (Cohen, R. J., et al., 2001). SSO allows users to access several protected applications without having to be authenticated (Akula, N. S., & Chatoth, V. P., 2016).

In answer to the need for integrated services, an application is needed as a gateway to access protected services. Because applications are developed with different resources, the authentication mechanism is also other. From the data collection and interviews, the expected solution leads to the availability of an application to allow users to only have one ID to access all running services.

4.2 Result

To integrate several services / applications, two methods are carried out based on the data requirements to be used. To be integrated with an academic information system containing absent data, grades and khs, a web service is developed with parameters as reference are nim and semester. Web services (Roman, D., et al., 2005) have enhanced new functionality on today's web, by integrating distributed software components using web standards by using PHP, the web service is developed by creating a class that contains methods that will be used as a web service. Some of the files provided are akses_web_service.php, connections.php, khs.php, and web_service.php. The web service is needed to make data requests so that all services currently running do not need to be moved and combined on the same server considering the current infrastructure is inadequate. The resulting interface display can be seen in fig below

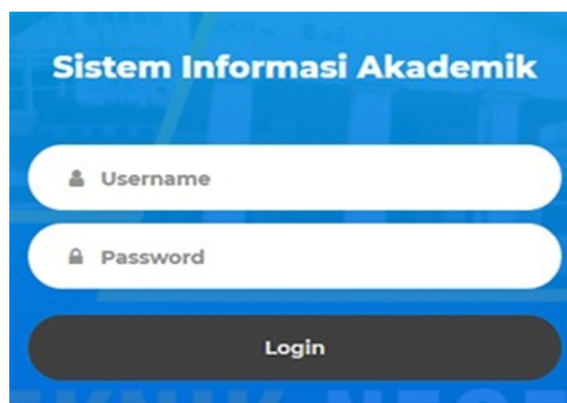


Figure 2: Login Menu.

Every user has a dashboard to carry out academic activities. The user division consists of lecturers, students, operators, administrators, and managers. The managerial function is to monitor and validate the educational documents of lecturers and students. Operators are tasked with inputting data related to the study program, including schedules, curriculum, guardianship, and other academic data.



Figure 3: Navbar Application.

Menus on the navigation bar, there are some data that must be retrieved in different systems including KHS Approval. All students' KHS data is stored on the academic portal. For the need for KHS approval from guardian lecturers, in this new normal condition, consultations will be carried out online. The consultation form with the guardian lecturer is placed on a different application. And to be able to do KHS approval, a web service is developed so that when the student has finished consulting, the guardian lecturer will click the KHS approval menu so that the lecturer signature in the form of a QR code will automatically enter the student's KHS. while the results obtained on the student dashboard for printing are like the fig 3

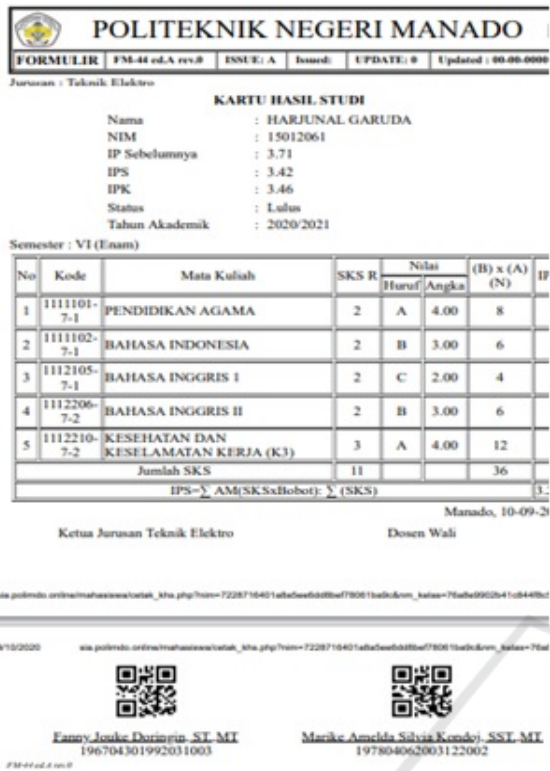


Figure 4: KHS Display.

The second method for developing integrated services is to provide an auto login menu. The ID of the user is stored in the application to access services/applications that are made separately and do not require data exchange. This aims to make it easier for users who often forget the IDs of several services/applications that are already running. The auto login menu can be seen in figure 4

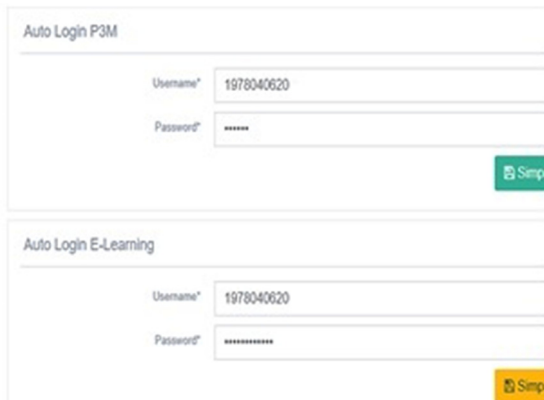


Figure 5: Auto Login.

System has been connected to the P3M and e-learning system using one account without logging in. The system will continue to be developed so that all

applications running on different hosts can be integrated without making changes. Based on the test results of 109 lecturers and 35 students by questionnaires, the integrated information system developed is feasible to be implemented in Polimdo. The assessment variables used as a reference include completeness of features, convenience and flexibility

Table 1: Respondent.

Department	Lecturers	Students
Civil Engineering	22	5
Electrical Engineering	25	10
Mechanical Engineering	15	5
Accounting	20	5
Business Administration	20	5
Tourism	7	5

15 out of 109 lecturers stated that the system developed was very feasible, and 94 were feasible. And 35 students said that the system is possible to implement. The test is carried out by giving scores on variables ranging from 1 to 4, namely very unfit, less viable, feasible, and very feasible. Respondent test results can be seen in the image below:

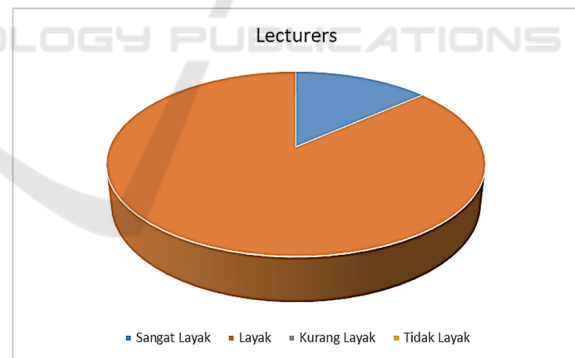


Figure 6: Test Lecture.

In addition to testing potential users to obtain validity through questionnaires, this study has conducted testing using the black box testing method by testing forms related to monitoring academic activities. Functional testing is performed by rendering the observed application a "black box" based on a design requirement or specification the application entity under test. The expected result is called a test forecast. Functional testing mainly focuses on the external behavior of software entities (Nidhra, S., & Dondeti, J., 2012; Mitra, P., Chatterjee, S., & Ali, N., 2011).

Black box testing is done to complete the test results directly from potential users. Tests are carried out to answer questions about how the functions being tested can be declared valid and sensitive to certain input data (Khan, M. E., 2011; Khan, M. A., & Sadiq, M., 2011).

Table 2: Blak Boxing Testing Result.

Scenario	Test Case	Expected results	Test result
Fill in the username and pass	User (Nip) , Pass (blank)	Login failed	Valid
Input the correct login data, press enter to enter the system	User (Nip) , Pass (123)	The system accepts access and displays the user dashboard	Valid
Lecturers create absentee tokens and students fill in tokens for attendance	Chat on the academic guidance menu	There is communication between students and lecturers	Valid
KHS Approval	The lecturer clicks the KHS approval menu	KHS is digitally signed using QRcode	Valid

Based on table 2, the results obtained are that the system can run as expected / valid. The error that occurs from the test results is when the user enters the wrong user and pass, the size and file format are not appropriate.

Data input difficulties occur when operators input schedule data because they have to adjust to the existing format. Schedule data input will activate the attendance list menu and lecture monitoring. Error inputting schedule data will have an impact on the attendance data which will not appear when creating an attendance token. The need for academic documents as substance for monitoring and evaluation carried out by the quality control group (GKM) every semester can be seen in the account of the head of the study program who monitors and validates according to the standard format.

5 CONCLUSIONS

From the research we have done and based on the results of testing 144 users by following predetermined procedures, it can be concluded that based on the test results of prospective users, the system developed is feasible to use to anticipate learning in the new normal. Moreover, SSO is very well used to support integrated information systems with adequate infrastructure support for security. Furthermore, the system developed makes it easier for lecturers and students to communicate related to mentoring consultations.

ACKNOWLEDGEMENTS

For all the assistance provided by Polimdo, the research team would like to thank all those who have helped carry out this research activity.

REFERENCES

Anggrainingsih, R., Sihwi, S. W., & Aziz, A. (2012). In English: Study of the Application of Integrated Information Systems in the Informatics Department, FMIPA, Universitas Sebelas Maret. ITSMART, Jurnal Teknologi dan Informasi, 1(1), 34-43.

Laudon., K. C.; Laudon, J. P. 2004. Management Information.

Idris, I., Napitupulu, H., & Matondang, N. (2018). In English : Designing an Integrated Campus Information System in the LP3I Medan Polytechnic Environment . Teknovasi, 2(1), 22-35.

Jogiyanto, (2005). In English: Analysis and Design of Information Systems. Penerbit Andi, Jakarta

Kondo, M. A., & Langi, H. S. Design and Implementation of Integrated Information Technology on SME Coconut Oil in North Sulawesi of Indonesia. International Journal of Computer Applications, 975, 8887.

Kahar, N. in English: Decision Support System for Jamkesda Recipients in Jambi City , Konferensi Nasional Informatika, Vol 1, pp, 215-220, 2013.

Cohen, R. J., Forsberg, R. A., Kallfelz Jr, P. A., Meckstroth, J. R., Pascoe, C. J., & Snow-Weaver, A. L. (2001). U.S. Patent No. 6,178,511. Washington, DC: U.S. Patent and Trademark Office.

Akula, N. S., & Chatoth, V. P. (2016). U.S. Patent No. 9,413,750. Washington, DC: U.S. Patent and Trademark Office.

Roman, D., Keller, U., Lausen, H., De Bruijn, J., Lara, R., Stollberg, M. & Fensel, D. (2005). Web service modeling ontology. Applied ontology, 1(1), 77-106.

Nidhra, S., & Dondeti, J. (2012). Black box and white box testing techniques-a literature review. International

- Journal of Embedded Systems and Applications (IJESA), 2(2), 29-50.
- Mitra, P., Chatterjee, S., & Ali, N. (2011, April). Graphical analysis of MC/DC using automated software testing. In 2011 3rd International Conference on Electronics Computer Technology (Vol. 3, pp. 145-149). IEEE.
- Khan, M. E. (2011). Different approaches to black box testing technique for finding errors. International Journal of Software Engineering & Applications, 2(4), 31.
- Khan, M. A., & Sadiq, M. (2011, October). Analysis of black box software testing techniques: A case study. In The 2011 International Conference and Workshop on Current Trends in Information Technology (CTIT 11) (pp. 1-5). IEEE.

