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Lecturer Performance Information Systems Based on IAPS 4.0

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Abstract

Currently, the lecturer performance data based on IAPS 4.0 at Polman Babel are still not integrated yet and still collected in Microsoft Excel. This study aims to develop Lecturer Performance Information Systems Based on IAPS 4.0 that can assist the preparation and management of IAPS 4.0-based lecturer performance. This study follows the Systems Development Life Cycle includes planning and preparation, system analysis, system design, development, testing, and deployment. The system is developed using PHP programming language, MySql database, Codeigniter Framework, Bootstrap Framework for CSS, and the Guzzle library to create a REST Client that accesses the Google Scholar REST API. System testing in this study uses black-box testing to test system functionality. The functionality testing shows that the functionality of the system is 100% successful and accepted by stakeholders.

Keywords*: IAPS 4.0; Information System; Black-box; PHP; REST API; Guzzle*

Abstrak

Saat ini data kinerja dosen yang berdasarkan IAPS 4.0 di Polman Babel masih belum terintegrasi dan masih terkumpul di Microsoft Excel. Penelitian ini bertujuan untuk mengembangkan Sistem Informasi Kinerja Dosen Berbasis IAPS 4.0 yang dapat membantu penyusunan dan pengelolaan kinerja dosen berbasis IAPS 4.0. Penelitian ini mengikuti siklus hidup pengembangan sistem yang meliputi perencanaan dan persiapan, analisis sistem, perancangan sistem, pengembangan, pengujian, dan penerapan. Sistem dikembangkan menggunakan bahasa pemrograman PHP, basis data MySql, *Framework* Codeigniter, *Framework* Bootstrap untuk CSS, dan library Guzzle untuk membuat REST Client yang mengakses Google Scholar REST API. Pengujian sistem dalam penelitian ini menggunakan pengujian *black box* untuk menguji fungsionalitas sistem. Pengujian fungsionalitas menunjukkan bahwa fungsionalitas sistem 100% berhasil dan diterima oleh pengguna.

Kata kunci: IAPS 4.0; Sistem Informasi; Blacbox testing; PHP; REST API; Guzzle

1. INTRODUCTION

Based on the National Accreditation Board for Higher Education (Badan Akreditasi Nasional – Perguruan Tinggi) Regulation No. 2/2019, since April 1, 2019, Universities and Study Programs in Indonesia are required to submit accreditation proposals using a new instrument called the Study Program Accreditation Instrument (IAPS 4.0) which is outcome-oriented. IAPS 4.0 consists of a Self-Evaluation Report (LED) and a Study Program Performance Report (LKPS) which describes the status and analysis of the achievements of each criterion. IAPS 4.0 contains study program performance indicators [1]. One of the performance indicators in LKPS is the performance indicator of human resources, namely lecturers in accredited study programs.

IAPS 4.0 has several differences from the previous accreditation instruments [2] [3]. IAPS 4.0 is outcome-oriented, while the previous accreditation instrument was input-oriented. The difference has impacts on the readiness of the study program in integrating existing data between the Study Program Management Unit (UPPS) and the Study Program. This is because the data in UPPS still has a different presentation format from the IAPS 4.0 format.

One of the important indicators in IAPS 4.0 is the lecturer performance indicator within the accreditation period. Based on LKPS IAPS 4.0, lecturer performance indicators consists of educational and teaching activities, lecturer recognition, research and community service, research output, books, patents, intellectual property, products/services, lecturers' scientific performances, exhibitions, presentations, publications, scientific citations, products/services adopted by society, applied technology, and others [4].

Currently, the lecturer performance data based on IAPS 4.0 at Polman Babel are not integrated yet and collected in Microsoft Excel. This issue causes the process of preparing accreditation instruments more difficult.

Studies related to lecturer performance have been proposed before. Research by Mahmudi [5] aimed to design a performance information system for lecturers and employees based on student questionnaires and peer assessments. This study focused on designing information systems based on student questionnaires and peer assessments, but did not focus on the performance of the lecturers based on IAPS 4.0.

A study by Ari Jayanti [6] designed a lecturer performance information system based on education and teaching, research, community service, and supporting activities carried out by lecturers by applying a ranking to lecturer performance. However, this study did not include other lecturer research outcomes, such as books, recognition, patents, and lecturer citations. Another relevant study by Ester Lumba [7] developed a desktop-based application for MVC-based lecturer performance reports with the attributes of education and teaching, research, community service.

There were also some studies related to lecturer performance information systems. Wiriasto [4] proposed a software based on IAPS 4.0 by uploading Microsoft Excel files into the software, then displaying the Excel format on a web page. The software relied on Microsoft Excel files uploaded by users and did not use any database. In fact, databases are necessary to keep data to be accurate, easily accessible, and consistent.

A study by Supit [8] proposed a web-based study program accreditation simulation application using calculations from the excel file of the study program accreditation simulation. The result of this study was the system can simulate the results of accreditation. Similar to the previous study, this study also used Microsoft Excel files uploaded by users.

Meanwhile, a study by [9] developed a web-based accreditation system with a fuzzy inference system and to build a prediction of scores and accreditation status. However, this research does not specifically manage lecturer performance indicators.

For studies on accreditation, several studies had also examined the design and development of information systems for accreditation of study programs [10][11][12]. However, previous research used accreditation form systems and did not use IAPS 4.0.

From the previous study, it can be concluded that the design and development of information systems that specifically focus on lecturer performance with the IAPS 4.0 framework have not been carried out. The design and development of the information system are carried out in this study.

Based on the explanation above, we propose Lecturer Performance Information Systems Development Based on IAPS 4.0 that can assist the preparation and management of IAPS 4.0-based lecturer performance in a transparent and integrated manner in higher education. This Lecturer Performance Information System can record, manage, and display lecturer performance outcomes based on the attributes determined by BAN-PT. This information system also implements the REST API Client to retrieve citation data for lecturers' publications from Google Scholar and display visualizations in graphical form to describe the data more concisely.

2. RESEARCH METHOD

The study consists of six main steps sequentially, starting with the requirement analysis step, information system design, information system design development, testing, and deployment step. The steps of the study were described in Figure 1.

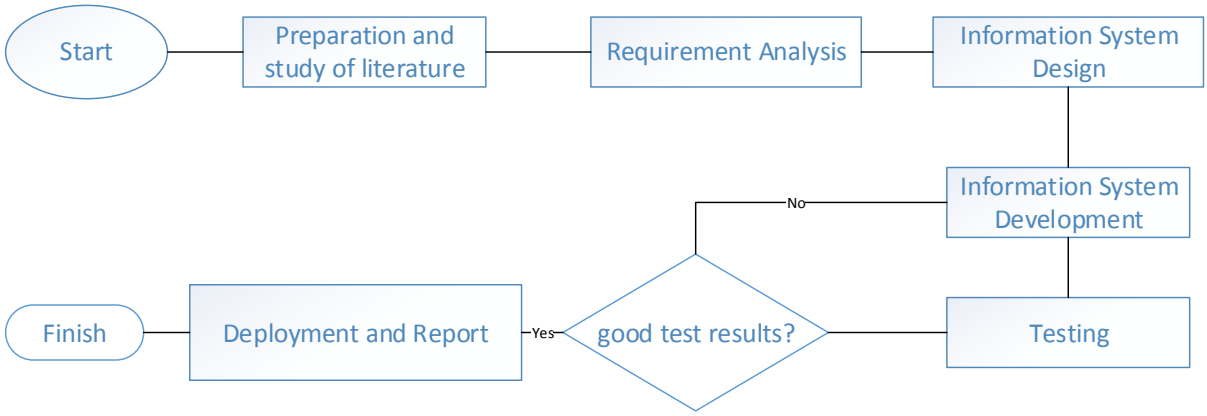


Figure 1. Research Steps

2.1. Preparation and Study Literature

The first step is Preparation and Study Literature. At this step, data collection was carried out at Polman Babel. We conducted interviews and document observations in the Quality Assurance Unit and Research and Community Service Unit of Polman Babel.

2.2. Requirement Analysis

After the data has been successfully collected, the data is analyzed to produce a list of requirements. The list of requirements obtained from the requirements analysis process includes user requirements, functional requirements, and non-functional requirements. User requirements describe what a user does to the system. Functional requirements describe what functions are performed by the system. Meanwhile, non-functional requirements are related to the performance displayed by the system, such as, speed in carrying out certain tasks.

There are two types of system users. The first type is administrator users who refer to officers in the Research and Community Service Unit. The second type is guest users. Guest users do not require log in. The functional requirements of the lecturer performance information system are described in Table 1.

Table 1. Functional Requirements

Func No	Functional Requirement
1	- The system can manage lecturer data
2	- The system can display the entire lecturer data or based on the study program
3	- The system can manage lecturer recognition data
4	- The system can display overall recognition data or based on keyword searches
5	- The system can display lecturer recognition data based on the study program
6	- The system can display a graph of the number of lecturer recognition by the year
7	- The system can manage lecturer research data
8	- The system can display all lecturer research data or based on keyword searches
9	- The system can display lecturer research data based on the study program
10	- The system can manage lecturer service data
11	- The system can display the number of lecturer recognition using graphic by year
12	- The system can display all lecturer service data or based on keyword searches
13	- The system can display lecturer service data based on the study program
14	- The system can display a graph of the number of lecturer service by year
15	- The system can manage lecturers' Intelectual Property data.
16	- The system can display all Intellectual Property (IPR) data for lecturers or based on keyword searches

- The system can display IPR data for lecturers based on the study program
- The system can display a graph of the number of IPR lecturers by year
- The system can manage lecturer patent data.
- The system can display all lecturer patent data or based on keyword searches
- The system can display lecturer patent data based on the study program
- The system can display a graph of the number of lecturers' patents by year
- The system can manage book data with ISBN lecturers
- The system can display all lecturers' ISBN book data or based on keyword searches
- The system can display lecturer book data based on the study program
- The system can display a graph of the number of lecturers' books by year
- The system can manage lecturer publication data
- The system can display all lecturer publication data or based on keyword searches
- The system can display lecturer publication data based on the study program
- The system can display a graph of the number of lecturers' publications by year
- The system can display data from lecturers' scientific papers cited on Google Scholar
- The system can manage product/service/applied technology/Social Engineering data produced by lecturers
- The system can display all product/service data/applied technology/Social Engineering lecturers or based on keyword searches
- The system can display data on lecturers' products/services/applied technology / Social Engineering based on the study program
- The system can display a graph of the number of products/services/applied technology/Social Engineering lecturers by year
- The system can display a graph of the number of books written by lecturers by year

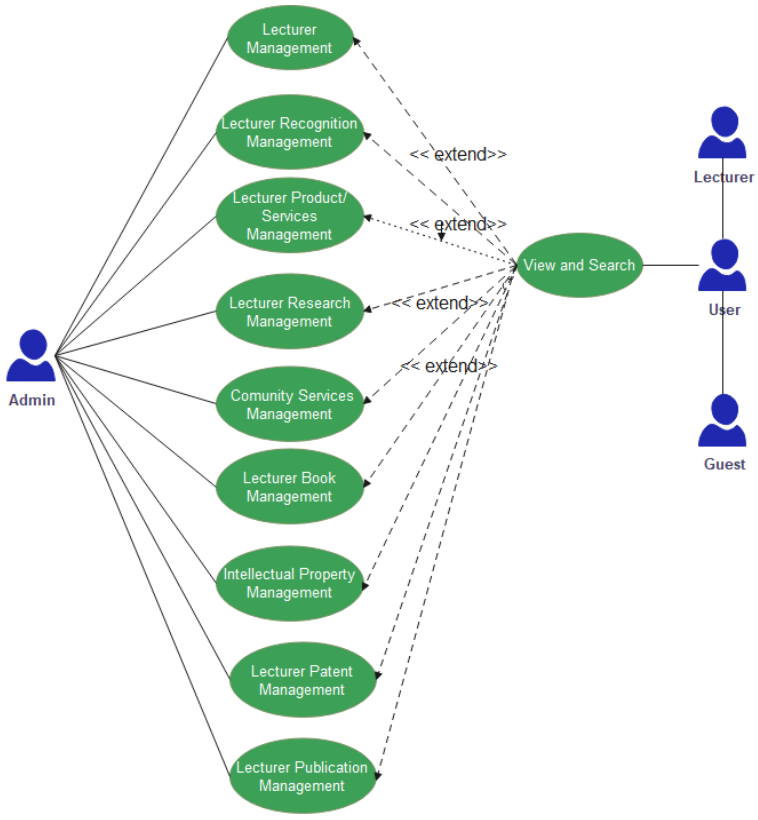


Figure 2. Use Case Diagram

2.3. Information System Design

The next step is to design a system based on the requirements obtained from the previous step. The system design in this study includes use case diagrams, activity diagrams, and database designs [13].

Use case diagrams are used to model interactions between the user and the system [14] [15] [16]. Admin users can manage, view, and search for data on the system. Meanwhile, guest users can only see data on the system. Use case diagram is depicted in Figure 2.

This information system consists of 13 tables, including lecturer table, intellectual property table, patent table, book table, recognition table, research table, community service table, applied technology table, publication table, service product table, lecturer home base table, and sources of funds table.

2.4. Information System Development

At the System Development stage, the system is developed based on the system design that has been made. The system is developed using PHP programming language, MySql database, Codeigniter Framework, Bootstrap Framework for CSS, and the Guzzle library to create a REST Client that accesses the Google Scholar REST API.

2.5. Testing

System testing in this study uses black-box testing to test system functionality [17]. Black-box testing does not require the tester to see the contents of the source code of the programs. It evaluates the system output, such as the appearance of the application and the suitability of the function flow with the business processes desired by customers. The testing is successful if the function meets the user requirement [18].

2.6. Deployment and Report

Deployment is the last stage in software development. In this stage, the system developed is then placed on a web server so that customers can access it easily.

3. RESULTS AND DISCUSSION

3.1. Results of System Development

The result of the developed information system is a website-based information system. To access the system, the user must log in first. After logging in, the main system page will display the main features of the system. The main page of the information system is described in Figure 3. From Figure 3, the user can select the main menu of the system, such as the lecturer recognition menu, lecturer research, lecturer service, and others.

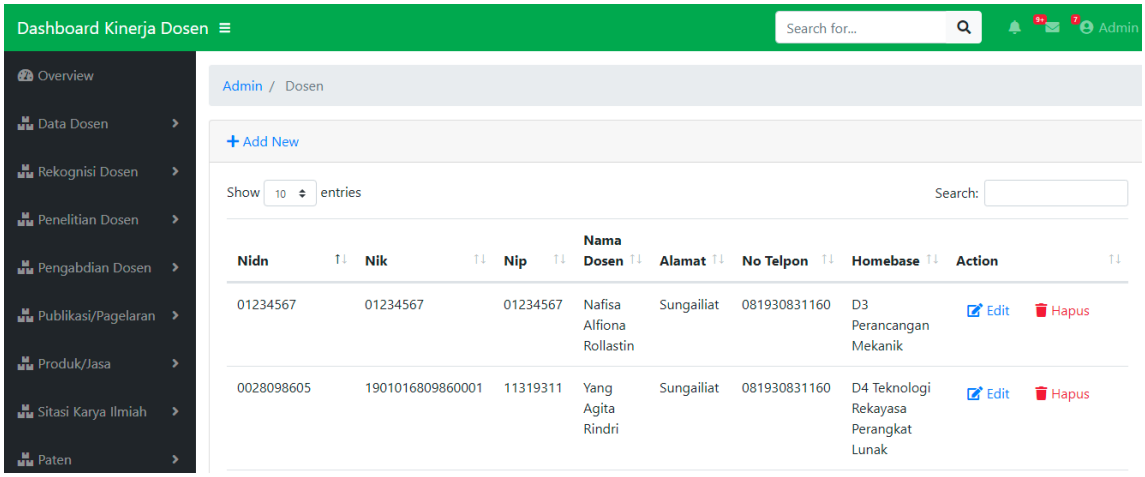
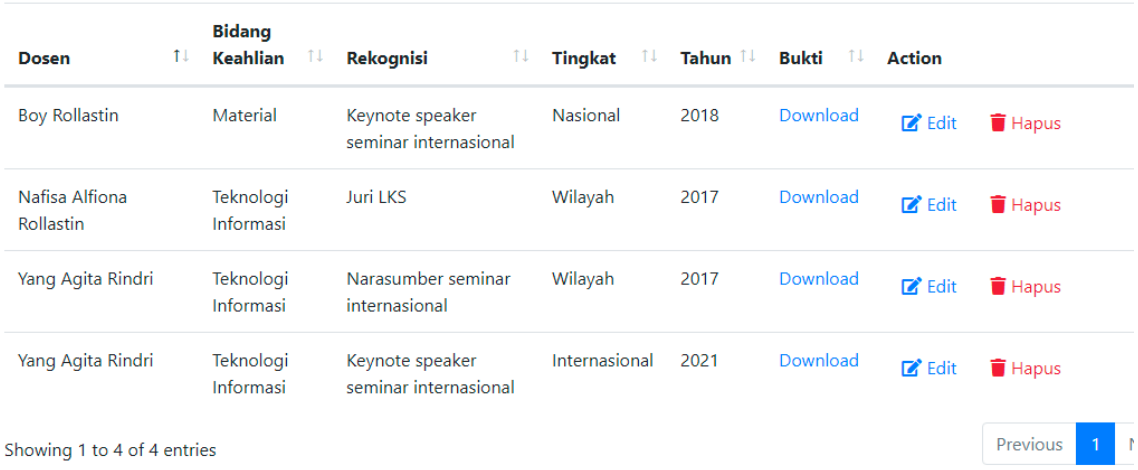


Figure 3. Main Page



Dosen	Bidang Keahlian	Rekognisi	Tingkat	Tahun	Bukti	Action
Boy Rollastin	Material	Keynote speaker seminar internasional	Nasional	2018	Download	Edit Hapus
Nafisa Alfiona Rollastin	Teknologi Informasi	Juri LKS	Wilayah	2017	Download	Edit Hapus
Yang Agita Rindri	Teknologi Informasi	Narasumber seminar internasional	Wilayah	2017	Download	Edit Hapus
Yang Agita Rindri	Teknologi Informasi	Keynote speaker seminar internasional	Internasional	2021	Download	Edit Hapus

Showing 1 to 4 of 4 entries

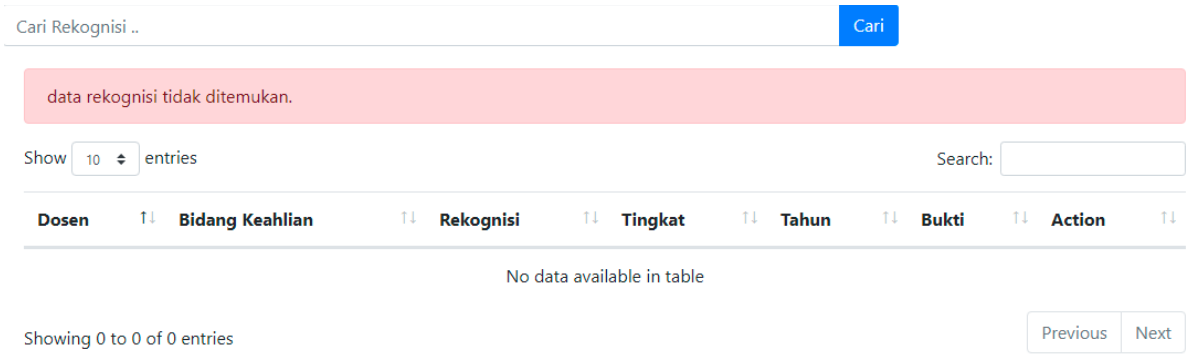
Previous 1

Figure 4. Recognition Menu

After the user selects one of the main menus, the system will display a page from that menu. Users can choose one of the main menus, for example the lecturer recognition menu. The result of selecting the main menu is shown in Figure 4.

Figure 4 shows that when the user selects the lecturer recognition menu, the system displays all the lecturer recognition data at Polman Babel. Users can download recognition evidence to view recognition evidence in the form of a pdf or image file. It can also be seen in Figure 4 that there is a recognition search feature based on the keyword category of the lecturer name, area of expertise, recognition, level of recognition, or year of recognition.

The system will display the data based on the keyword entered by users. Moreover, Figure 5 shows that the search results are not found if the user enters a keyword that is not available in the keyword category.



Cari Rekognisi .. Cari

data rekognisi tidak ditemukan.

Show 10 entries Search:

Dosen	Bidang Keahlian	Rekognisi	Tingkat	Tahun	Bukti	Action
No data available in table						

Showing 0 to 0 of 0 entries

Previous Next

Figure 5. Searching Lecturer Recognition Data based on Keywords

In addition to displaying all data or data based on search keywords, the system can also calculate the number of lecturer performance indicators per study program and display charts per year in Figure 6.

For the number of citations for lecturers, the system displays the number of citations per lecturer based on Google Scholar. The feature of lecturers' citations is shown in Figure 7. The feature display all lecturer's publications and the number of citatitons.

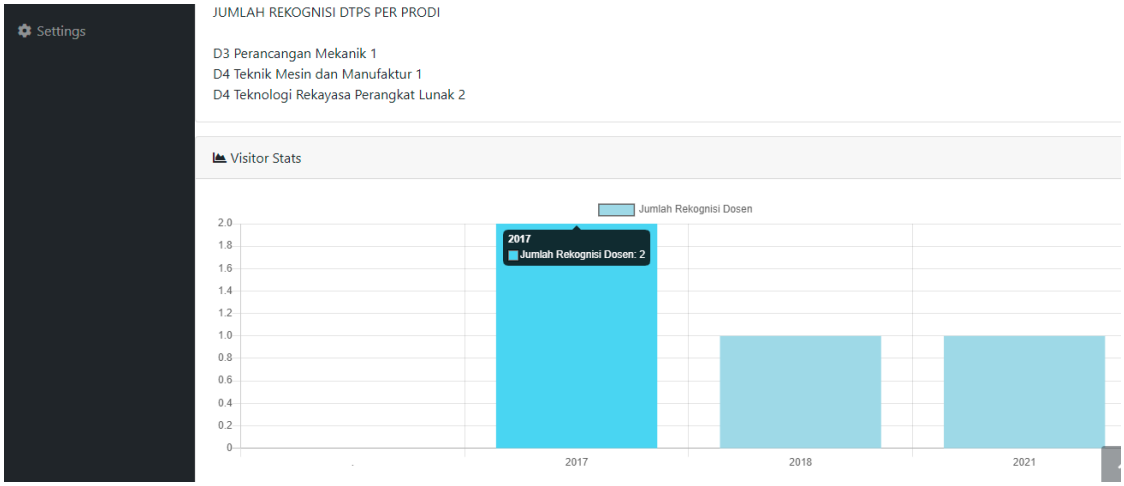


Figure 6. Recognition based on Study Program and Year

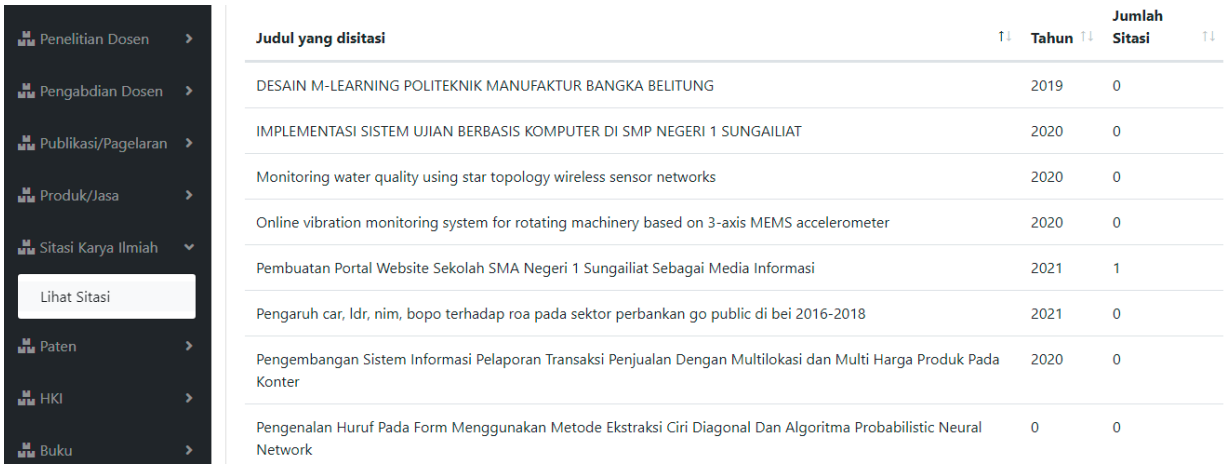


Figure 7. Scientific Citation of Each Lecturer

System functional testing is carried out using Black Box method [19] [20] to determine whether the features are running as expected. Examples of test cases and test results are presented in Table 2.

Table 2. Lecturer Recognition Feature Testing

Tested feature	Test Case	Expected Results	Result
Lecturer recognition	Add lecturer recognition	- Recognition data is saved to the database and appears on the recognition page	Success
		- The recognition evidence file that has been uploaded appears on the recognition page	Success
		- The download file are as expected	
	Update lecturer recognition	- The recognition data in the database is updated and appears on the recognition page	Success
		- The updated recognition evidence file appears on the recognition page	Success
		- The download results match the uploaded file	
	Do not fill in the value in the text input which is mandatory	- The system asks the user not to leave blank the text input that is mandatory	Success
	Upload files over 15 MB	The system displays an error message that the file size should not exceed 15 MB	Success

Looking for lecturers' recognition in the input search, looking for recognition	- Search results appear based on the keywords entered by the user	Success
Displays the number of recognition per study program	- The number of recognition per study program appears	Success
Download recognition	- The download results are as expected	Success

Table 2 describes the test results on the lecturer recognition features. The test cases on other features are not much different from the lecturers' recognition features. The testing process is carried out iteratively to get 100% successful test results. The testing is 100% successful if the function meets the user requirement. A recapitulation of the overall feature testing is shown in Table 3.

Table 3. Results of Overall Features Testing

Features	Number of Test Cases	Success Testing
Lecturer data	9	100%
Lecturer Recognition	7	100%
Lecturer Research	8	100%
Lecturer Service	9`	100%
Patent	9	100%
Intellectual Property	9	100%
Publications	9	100%
Products / Services	9	100%
Scientific Citations	3	100%
Book	9	100%
Applied technology	9	100%

4. CONCLUSION

This study aims to develop a lecturer performance information system based on IAPS 4.0. There are two types of users, i.e guest, and administrator. The functional requirements consist of 36 requirements. The functionality requirements were tested using black-box testing. The results of the system functionality test show that the functionality of the system is running well according to user needs. The information system can help admin staff in the Unit of Research and Community Service of Polman Babel to manage lecturer performance based on IAPS 4.0.

REFERENCES

[1]. I. Ulum, "Jurnal ReviuAkuntansi dan Keuangan," *Intellectual Capital Framework Perguruan Tinggi Di Indonesia Berdasarkan Instrumen Akreditasi Program Studi (IAPS) 4.0*, vol. 9, no. 3, pp. 309-318, 2019.

[2]. L. I. Herawati, I. Ulum, A. Juanda dan D. Syam, "Pengungkapan Modal Intelektual Perguruan Tinggi Vokasi Di Indonesia Berdasarkan Instrumen Akreditasi Program Studi (IAPS) 4.0," *Ekuitas: Jurnal Ekonomi dan Keuangan*, vol. 4, no. 1, pp. 107-121, 2020.

[3]. A. dan T. A. Rachman, Desain Pengembangan Mutu Perguruan Tinggi Berbasis IAPT 4.0, Penerbit Laduny, 2019.

[4]. G. W. Wiriasto, "Pemanfaatan Perangkat Lunak Sistem Informasi Akreditasi Program Studi dengan 9-Standar dalam Penyusunan Dokumen Akreditasi Berdasarkan Instrumen Akreditasi Program Studi 4.0 (IAPS 4.0)," *Jurnal Pengabdian Magister Pendidikan IPA*, vol. 3, no. 2, pp. 205-209, 2020.

[5]. A. Mahmudi, "Sistem Informasi Penilaian Kinerja Dosen dan Karyawan Berbasis Web," *Surya Informatika,* vol. 1, no. 1, pp. 55-60, 2015.

[6]. N. K. D. Ari Jayanti, "IMPLEMENTASI METODE SAW DAN AHP PADA SISTEM INFORMASI PENILAIAN KINERJA DOSEN," *CSRID Journal,* vol. 8, no. 2, pp. 86-98, 2016.

[7]. L. Ester dan A. Waworuntu, "Application of Lecturer Performance Report in Indonesia with Model View Controller (MVC) Architecture," dalam *The 2020 2nd Asia Pacific Information Technology Conference*, Bali, 2020.

[8]. J. W. Supit, V. Tulenan dan S. R. Sentinuwo, "Rancang Bangun Simulasi Akreditasi Program," *Jurnal Teknik Informatika,* vol. 15, no. 3, pp. 163 - 170, 2020.

[9]. Y. Hermawan, I. Hermadi dan H. Sukoco, "Sistem Kelayakan Borang Akreditasi Program Studi Menggunakan Fuzzy Inference System," *Jurnal Analisis Sistem Pendidikan Tinggi,* vol. 4, no. 1, pp. 67-76, 2020.

[10]. R. Kurniawan dan F. Arkan, "Rancang Bangun Sistem Borang Akreditasi Program Studi Teknik Elektro Universitas Bangka Belitung," *Jurnal Ecotipe,* vol. 3, no. 2, pp. 31-38, 2016.

[11]. T. S. Sukamto, . L. E. Nugroho dan W. W. Winarno, "Desain Sistem Informasi Akreditasi Program Studi Berbasis Website di Indonesia," dalam *Seminar Nasional Aplikasi Teknologi Informasi (SNATI)*, Yogyakarta, 2016.

[12]. S. Nurmiati dan H. Munandar, "SISTEM INFORMASI KEGIATAN AKADEMIK UNTUK AKREDITASI PROGRAM STUDI BERBASIS WEB STUDI KASUS PROGRAM STUDI MANAJEMEN SUMBERDAYA PERAIRAN - IPB," *Jurnal SISFO : Inspirasi Profesional Sistem Informasi,* vol. 5, no. 5, pp. 514-522, 2016.

[13]. M. Muslihudin dan O. , Analisis dan Perancangan Sistem Informasi Menggunakan Model Terstruktur dan UML, Yogyakarta: Andi, 2016.

[14]. R. Fauzan dan D. Siahaan, "Use Case Diagram Similarity Measurement: A New Approach," dalam *l2th International Conference on Information & Communication Technology and System (lCTS)*, Surabaya, 2019.

[15]. T. . v. d. Maßen dan H. Lichter , "Modeling Variability by UML Use Case Diagrams," dalam *International Workshop on Requirements Engineering for Product Lines*, Essen, 2002.

[16]. R. Afriansyah dan Y. , "Pengembangan Sistem Informasi Pelaporan Transaksi Penjualan Dengan Multilokasi dan Multi Harga Produk Pada Konter," *Jurnal Teknologi Manufaktur,* vol. 12, no. 2, pp. 1-9, 2020.

[17]. B. H. Rambe, R. Pane, D. Irmayani, M. Nasution dan I. R. Munthe, "UML Modeling and Black Box Testing Methods in the School Payment Information System," *Jurnal Mantik,* vol. 4, no. 3, pp. 1634-1640, 2020.

[18]. S. Nidhra dan J. Dondeti, "BLACK BOX AND WHITE BOX TESTING TECHNIQUES –A LITERATURE REVIEW," *International Journal of Embedded Systems and Applications (IJESA),* vol. 2, no. 2, pp. 29-50, 2012.

[19]. A. Verma, A. Khatana dan S. Chaudhary, "A Comparative Study of Black Box Testing and White Box Testing," *International Journal of Computer Sciences and Engineering,* vol. 5, no. 12, pp. 301-304, 2017.

[20]. T. S. Jaya, "Pengujian Aplikasi dengan Metode Blackbox Testing Boundary Value Analysis," *Jurnal Informatika: Jurnal Pengembangan IT (JPIT),* vol. 3, no. 2, pp. 45-48, 2018.