PILAR Nusa Mandiri: Journal of Computing and Information System
Vol. 21, No. 2 September 2025 | DOI: 10.33480/pilar.v21i2.6487

UTILIZING END USER DEVELOPMENT METHOD FOR DEVELOPING *PENCAK SILAT* ORGANIZATION INFORMATION SYSTEMS

Heribertus Ary Setyadi[1*]; Hartati Dyah Wahyuningsih[2]; Galih Setiawan Nurohim[1]; Sundari[3]

Information System[1]
Universitas Bina Sarana Informatika, Surakarta, Indonesia[1]
www.bsi.ac.id[1]

Information System[2]
Universitas Dharma AUB, Surakarta, Indonesia[2]
www.undha.ac.id[2]

Information Technology[3]
Universitas Duta Bangsa, Surakarta, Indonesia[3]
www.udb.ac.id[3]
heribertus.hbs@bsi.ac.id[*], hartati.dyah@stmik-aub.ac.id, galih.glt@bsi.ac.id, sundari@udb.ac.id
(*) Corresponding Author

Abstract—*Gondang is one of the PSHT sub-branches located in Sragen Regency, Central Java, Indonesia. In managing member data from recruitment to promotion, conventional methods are still used using office applications and information dissemination is still using brochures and social media. This research aims to develop an information system that can help manage data and disseminate information at PSHT Gondang. The system developed can manage the registration of prospective member to become a member and the process of promotion. Delivery of information in the form of organizational structures, announcements, activity schedules, services for member and community, activity galleries containing photos and videos can also be accessed through the system.EUD was chosen as a method in system development because time required is quite short with a relatively small cost allocation. The system is created using Laravel framework and Firebase as a database with a responsive display so that it can be accessed using a smartphone. By using the EUD method, users can modify the appearance and existing information if there is a change in data from the organization which was not available in previous research.*

Keywords: *end user development, PSHT, system development.*

Abstrak—*Gondang salah satu ranting PSHT yang berada di Kabupaten Sragen Jawa Tengah Indonesia. Dalam mengelola data warga mulai dari perekrutan sampai kenaikan tingkat masih menggunakan aplikasi office dan penyebaran informasi dengan brosur dan media sosial. Tujuan penelitian ini untuk mengembangkan sistem informasi yang dapat membantu mengelola data dan penyebaran informasi di PSHT Gondang. Sistem yang dikembangkan dapat mengelola pendaftaran calon warga sampai menjadi warga dan proses kenaikan tingkat. Penyampaian informasi berupa susunan organisasi, pengumuman, jadwal kegiatan, layanan untuk warga dan masyarakat, galery kegiatan yang berisi foto dan video juga dapat diakses melalui sistem. End User Development (EUD) dipilih sebagai metode dalam pengembangan sistem karena waktu yang dibutuhkan cukup singkat dengan alokasi biaya relatif kecil. Sistem dikembangkan menggunakan Laravel dan Firebase sebagai basis datanya. Dengan menggunakan metode EUD, pengguna dapat melakukan modifikasi tampilan dan informasi yang ada jika terjadi perubahan data dari organisasi yang tidak ada pada penelitian sebelumnya.*

Kata Kunci*: end user development, PSHT, pengembangan sistem.*

INTRODUCTION

Pencak silat is a martial art that originated from the Indonesian nation ancestors and has been a culture in Indonesia since ancient times (Qutrotunaini, Nurrachmad, & Anam, 2022). *Pencak silat* is an Indonesian cultural heritage that should be preserved, the culture has developed since ancient times, Indonesian society makes *pencak*

silat a traditional art (Rachman et al., 2021). As a philosophical method that teaches spiritual and physical education, *pencak silat* helps its enthusiasts to internalize the noble moral values in it (Nurafifah, Hidayat, & Rahmat, 2024). The *pencak silat* organization that covers all *pencak silat* styles in Indonesia is named the Indonesian Pencak Silat Association or better known as IPSI. The *Persaudaraan Setia Hati Terate* (PSHT) is a pencak silat organization that is part of IPSI (Nugroho, Gontara, Angga, Jariono, & Maghribi, 2021). In 1902, Ki Ageng Soerodiwirdjo founded the first club. Initially named *Sedulur Tunggal Kecer* and the name of his *pencak silat* school was *Joyo Gendelo*. In 1917 the name was changed and the *Persaudaraan Setia Hati Pencak Silat* (SH) was born (Wiguno, Kurniawan, Wahyudi, Puspitasari, & Salamuddin, 2024). PSHT was founded in 1922 in Pilang Bangau Madiun, a martial arts sports organization founded by Ki Hadjar Hardjo Oetomo (Fiki Febriani, Arri Handayani, & G.Rohastono Ajie, 2022).

In its capacity as an organization based on cultural and traditional principles, PSHT has developed a wide community network, which focuses not only on self-defense training, but also on character building and social activities (Saputri, Firdaus, & Kurniawan, 2024). PSHT branches are spread throughout cities in Indonesia and many abroad. Almost every city in Indonesia has a PSHT branch (Arrosyid, Yuliawan, & Putra, 2024). In 2022, it was recorded that SH Terate had around 12 million members, had branches in 372 districts or cities in Indonesia, 24 commissariats in universities and 34 special branches abroad (Fadlika, Mu, Nur, & Wijaya, 2024). The Gondang branch was recorded as having 1,460 active residents in 2024. Although PSHT has many members and followers, the main challenge faced is the management of information and effective communication between members spread across various regions. facing similar problems in terms of information dissemination and activity coordination. Limitations in conventional communication methods such as direct meetings and brochures make the need for a digital platform that can reach wider members very important in the PSHT Gondang Sragen branch.

Entering the current millennial era, adaptation is needed from each organization to be able to provide convenience in all things, including in the field of martial arts (Wardana & Aribowo, 2021). A website is one of the media for delivering information and publications that are easily accessible from anywhere, anytime without being limited by geographical areas that can be utilized by an organization (Amadi, Utomo, & Budiman, 2022). A web-based information system is a system that is equipped with a design according to needs, which aims to simplify, speed up and perfect the data being processed (Astuti, Cahyadi, Kridalaksana, & Mulawarman, 2024).

The end user development (EUD) method is a computer-based information system that supports material and operational applications by users directly. In addition, EUD is a method in application development carried out by the user himself (Ponce & Abdulrazak, 2022). However, users can also develop information with the help of information specialists to become consultants in the field of computer systems (Vaiani & Paternò, 2024). EUD is useful for balancing development capabilities by reducing the communication gap between users and information specialists (Fogli & Tetteroo, 2022). In recent years, many users have taken the initiative to develop their own applications rather than relying entirely on information specialists. This approach is called end-user development or end user computing (Modesto et al., 2021). Users can play an active role in system development and are provided with the convenience of several features to be able to modify the system that has been developed. (Malizia, Valtolina, Serrano, & Maceli, 2021). This feature is not found in other system development methods.

There are three previous researches related to the development of the PSHT pencak silat information system and the EUD method used as a literature review in this research. In a research aimed at developing *Pendidikan Anak Usia Dini* (PAUD) information system, the EUD method use allows users to be involved and also active in the system development process. This research has succeeded in achieving its main objectives, namely helping to smooth the process of accepting new students, helping to increase the dissemination of school information, and can be used as an effective and efficient means of promotion for PAUD Ananda. The system developed only displays profile information and the registration process up to registration to enter school (Risqi, Suryadilaga, Raras, Dwi, & Fauziyah, 2024).

In research in the form of a literature review which discusses the role of technology in pencak silat, it is concluded that there is a significant role in the use of technology. The technologies reviewed in this research include the use of the internet of things (IOT) in a match, the use of interactive multimedia in learning and training, and information systems in a pencak silat organization. Globally, this research has succeeded in showing that the implementation of various forms of technology has become a necessity for the development of Pencak Silat, which has resulted in contributions to the world of education and sports (Sinulingga, Kasih, Hasibuan, Daulay, & Abdullah, 2024).

The research that also produced a web-based PSHT information system chose to use the

PILAR Nusa Mandiri: Journal of Computing and Information System
Vol. 21, No. 2 September 2025 | DOI: 10.33480/pilar.v21i2.6487

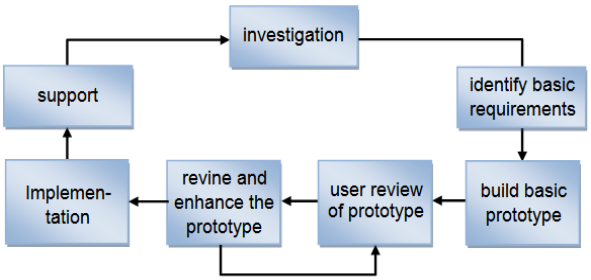
prototype method in its development stage. The research location was at the Palembang City PSHT branch which still uses Microsoft Office applications in managing data. The resulting system focuses on the registration process for prospective residents and information about existing activities. There is no description yet explaining the stages of the prototype method in the system development process. The resulting website is not yet responsive so it is not flexible when opened on a smartphone (Anjarweni & Erlansyah, 2022).

In this research, a web-based information system was developed that can manage general information, manage schedules and activities, manage data on PSHT members and residents, manage services needed by PSHT residents in the Gondang Sragen branch. The end user development method was used in developing the system in this research.

MATERIALS AND METHODS

The methodology in this research uses data collection methods and system development methods. Data collection methods are carried out in three stages, namely observation, interviews and literature studies. Observations were carried out by directly visiting the PSHT Gondang Sragen secretariat to find out the recruitment process for prospective residents, the data needed for residents, the inauguration process for residents, the management of the data needed and the information that needs to be displayed in the system. The information obtained is used to analyze and produce findings in the development of the system to be created. In the observation, an interview stage was also carried out with the management of PSHT Gondang related to the research object so that information was obtained from several roles in the organization. Literature study is carried out by studying theories from literature in the form of reference books, comparing research results in scientific journals or data obtained from the internet related to the research object as material for solving problems in this research.

EUD method was chosen for system development in this research because the time required for development is quite short with a small cost allocation, so it can be used to achieve predetermined time targets with cost efficiency. With EUD method, the system is designed according to user needs and users can control, manage, and implement the system. Another reason is that it does not hinder the ongoing business process when the system is being developed. Figure 1 presents the EUD method stages starting from investigation to support.



Source: (Schenkenfelder, Brandstätter, Kirchtag, & Wimmer, 2024)

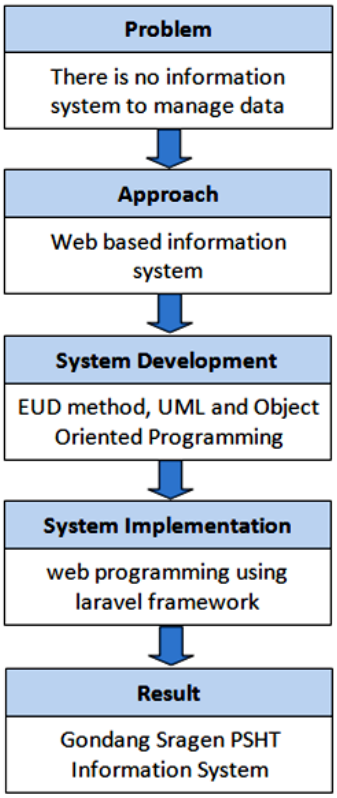
Figure 1. The EUD Method Stages

The stages carried out in this research can be explained according to Figure 2 as follows:

1. Investigation is carried out by means of direct observation and interviews as explained previously.
2. Identify basic requirements: from the results of the investigation, the system development team then conducts a needs analysis used to develop the system and reports to users for discussion and approval. The user needs of the developed system consist of admins, administrators, and members. The admin's main task is to manage master data and existing information including adding, editing and deleting data. Management can manage schedules and urgent information. Members can only fill out the registration form and view existing information.
3. Build basic prototype: writing program code to create a system according to user needs obtained from the results of the previous stage. System is developed using the laravel framework and Firebase as a database. There are 12 tables in database that are used to store data needed by system. The system is divided into three authorities, they are access rights as admin administrators and members. The web display is adjusted to each authority that has successfully logged in.
4. User review of prototype: presenting the system that has been created to users and asking for input from users about the features contained in the system.
5. Revine and enhance the prototype: the results of the presentation and discussion will be recorded to make improvements to the system that has been created so that it is in accordance with user expectations. After the improvements are made, they are presented again to the user, if improvements still need to be made, this stage is carried out again until the results are in accordance with user needs.
6. Implementation: at this stage the development team implements the system created by hosting and renting a domain, so that the system created can be accessed via the internet.

7. Support: Conduct training for users especially system administrators on how to manage data and information also modify the content and appearance of the system on the back end. At this stage also given a guarantee of maintenance for a certain period of time.

The research framework in Figure 2 explains the stages carried out for system development in this research. The stages start from determining the problem, the approach used, the system development carried out, system implementation and research results.

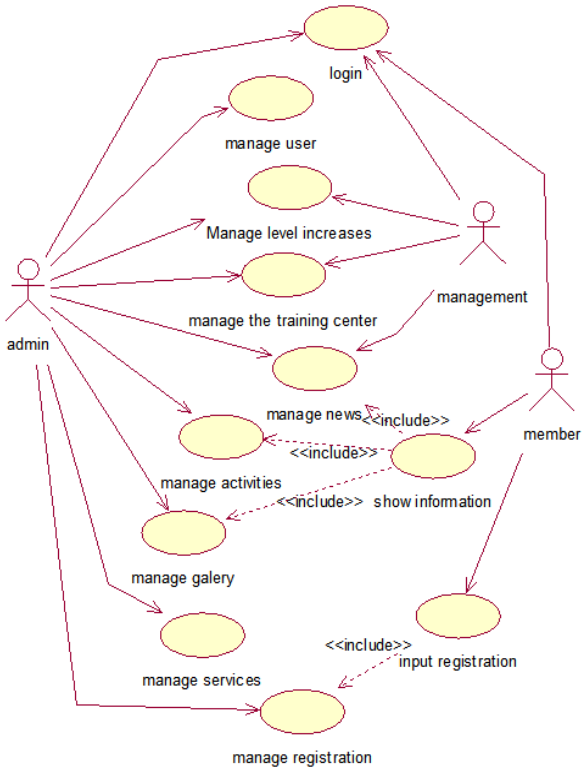


Source: (Research Result, 2025)
Figure 2. Research Framework

RESULTS AND DISCUSSION

Design System

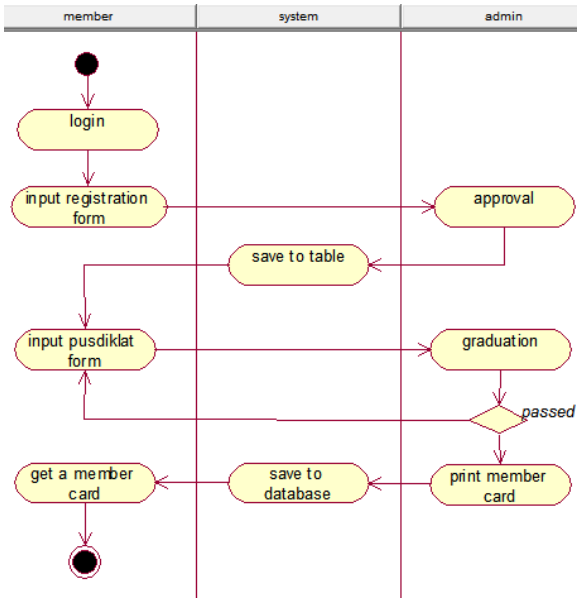
Based on the results of the Identify Basic Requirements stage, the system being developed requires three types of users. Figure 3 presents the use case diagram, which includes three actors: Admin, Management, and Members. The admin has full access to manage users, level increases, training centers, news, activities, galleries, services, and registrations. Use cases such as manage news and manage activities include the show information use case, while input registration is part of manage registration. The management actor can log in and manage level increases, training centers, and news. Meanwhile, the member actor can log in, fill in registration data, and view information. This diagram represents the system's functional requirements based on the roles of each user.



Source: (Research Result, 2025)
Figure 3. Use Case Diagram

Based on the use case in Figure 3, the main activity diagram presented in the developed system is the registration process until the prospective member officially becomes a citizen. The process begins with the prospective member logging in to the system after successfully registering. Once logged in, the user selects the registration menu and fills out the registration form. The submitted form is then stored in the system and awaits validation by the admin. Upon successful validation, the admin approves the application and updates the registrant's status. Following approval, the prospective member is required to complete the Pusdiklat (training center) form within the system to proceed to the selection stage. When the selection schedule is published, the admin evaluates the participant and assigns a graduation status. If the candidate is deemed eligible, they are declared as having passed. Finally, the admin prints a membership card, which can then be downloaded by the newly approved member. This entire process flow is illustrated in the activity diagram shown in Figure 4.

PILAR Nusa Mandiri: Journal of Computing and Information System
Vol. 21, No. 2 September 2025 | DOI: 10.33480/pilar.v21i2.6487



Source: (Research Result, 2025)

Figure 4. Registration and Selection Process Activity Diagram

Of the 12 tables in database that used in the system, the logical record structure is presented in Figure 5. There are several types of relationships between tables to automate data input and manage transactions in the system. There are 9 tables that function to store master data and 3 tables to store transactions or processes that occur. The three tables for storing transactions include *pusdiklat*, *warga* and *layanan*.

Implementation System

The PSHT Gondang Sragen system can be accessed by anyone containing general information and existing galleries. The initial display or home page of the system when accessed is presented in Figure 6. On the home page there are an introductory feature containing a brief history, news page, activity page, organizational structure page, and gallery containing photos and videos of activities. All of these features can be accessed by anyone without having to register first, so that the public can find out all the information about PSHT Gondang Sragen.

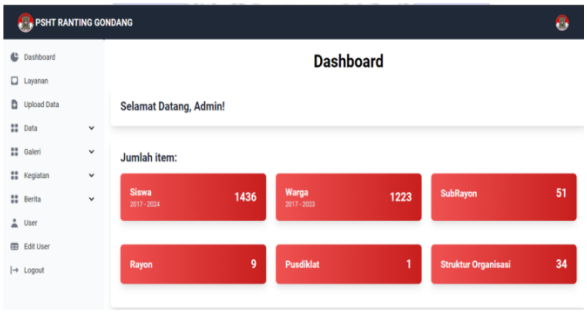
Source: : (Research Result, 2025)

Figure 6. Home Page View

Figure 7 is a system display on the admin side which contains several menus for data processing. Admin can manage registrant data, training centers, members, news and all data needed by the system.

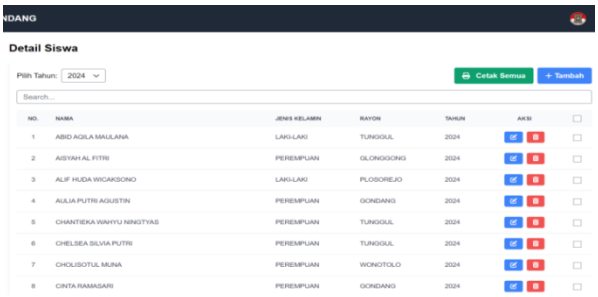
Source: (Research Result, 2025)

Figure 5. Logical Record Structure



Source: : (Research Result, 2025)
Figure 7. Admin Page Display

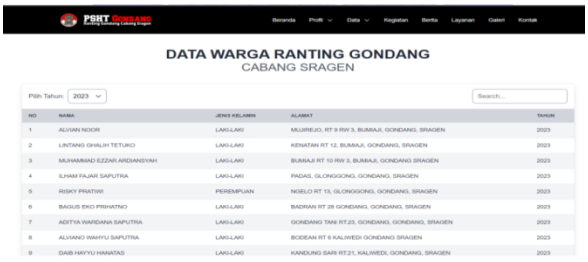
Figure 8 is a page for managing applicant data display that called students. Student data is not yet officially a member who has not carried out pusdiklat for selection or examination in order to be eligible to be appointed as a member.



Source: : (Research Result, 2025)
Figure 8. Manage Member Data Page Display

Figure 9 is a page for managing pusdiklat display that containing data on user who will take selection test. After being inputted into pusdiklat and there is a schedule for selection test, there will be a confirmation to each user.

Source: : (Research Result, 2025)
Figure 9. Manage Pusdiklat Page Display



Source: : (Research Result, 2025)
Figure 10. Member List Page Display

After user completes the pusdiklat and successfully passes the exam, then user data will become member data and is entitled to a membership card so that it is considered an official member of PSHT Gondang Sragen. The member list page display is presented in Figure 10.

Testing System

Program testing is done using black box testing that focuses on program input and output. Table 1 is a test for the data addition process result for all existing data processing forms.

Table 1. Test Results Add Data

Test case	Expected	Test results	conclusion
All data are still empty	Rejects and the message "all data must be filled in" appears.	An error message appears for every empty field.	Valid
There is empty data	Rejects and the message "all data must be filled in" appears.	An error message appears for empty field.	Valid
All data is entered	Successfully saved and confirmation appears	"successfully saved" message appears	Valid

Source: : (Research Result, 2025)

Table 2 is the system testing data editing process results in all existing data processing.

Table 2. Test Results Edit Data

Test case	Expected	Test results	conclusion
admin has not selected data	Rejected and the message "nothing has been selected" appears.	An error message appears for every empty field.	Valid
Admin edits data and clicks save button	Successfully edited and confirmation appears	"Successfully saved" message appears.	Valid

Source: : (Research Result, 2025)

Table 3 shows the process trial results on the Pusdiklat page.

Table 3. Test Results *Pusdiklat* Process

Test case	Expected	Test results	conclusion
Not select registrants who will undertake pusdiklat	Rejected and the message "no one selected yet" appears.	An error message appears if nothing is selected yet.	Valid
Already selected registrants and click the submit button	The selected data is entered into the table below	All selected data has been entered into the table below	Valid
click save button	Data is saved into the database	"successfully saved" message appears	Valid

Source: : (Research Result, 2025)

Table 4 is system test from the registration process result for members who have passed the training center and are entitled to receive a membership card.

Table 4. Test Results Member Process

Test case	Expected	Test results	conclusion
Not select registrants who have passed the Pusdiklat	Rejected and the message "no one selected yet" appears.	An error message appears if nothing is selected yet.	Valid
Already selected who have passed the Pusdiklat and click the submit button	The selected data is entered into the table below	All selected data has been entered into the table below	Valid
Click save button	Data is saved into the database	"successfully saved" message appears	Valid

Source: : (Research Result, 2025)

Table 5 is the system test results from the process of members requesting services from the management in the form of statement letter or other things that are already on the list.

Table 5. Test Results Services Process

Test case	Expected	Test results	conclusion
The service is not in the list	Rejects and the message "Service is unavailable" appears.	An error message appears if service is unavailable	Valid
Admin approves and clicks the process button	Service data is stored in a database	"successfully saved" message appears	Valid
Members receive confirmation	Confirmation appears in member account	Members can see confirmation	Valid
Member download service request	Service result can be downloaded by members	Service results successfully downloaded	Valid

Source: : (Research Result, 2025)

The questionnaire was designed using a four-point Likert scale to evaluate user perceptions of the system. The response categories were defined as follows: Disagree (D), representing a negative evaluation; Quite Agree (QA), indicating a moderately positive response; Agree (A), denoting a positive perception; and Very Agree (VA), reflecting a highly positive evaluation.

The results of the questionnaire filled out by 15 PSHT members who accessed the system are shown in Table 6.

Table 6. Respondent Assessments Results as PST Members

Question	D	QA	A	VA	Total
Attractive system display	0	0	8	9	17
The system is responsive	0	0	6	11	17
Easy to use system	0	2	5	10	17
Information is complete	0	4	6	7	17
Service process is Complete	0	4	7	6	17

Source: : (Research Result, 2025)

From Table 6, it can be seen that most users either agreed or strongly agreed with the system's visual appeal, responsiveness, and ease of use. Slightly more varied responses were given regarding the completeness of the information and the service process, indicating potential areas for further improvement.

Similarly, the questionnaire was also administered to five system administrators responsible for managing data and modifying the system. Their responses are summarized in Table 7.

Table 7. Respondent Assessments Results as System Admin

Question	D	QA	A	VA	Total
Adding data is easy	0	0	2	3	5
Easy edit and delete data	0	0	3	2	5
Pusdiklat process is suitable	0	0	3	2	5
Service process is suitable	0	0	2	3	5
Easy information editing	0	0	2	3	5
Easy to modify appearance	0	0	3	2	5
Easy data input modification	0	0	3	2	5

Source: : (Research Result, 2025)

As shown in Table 7, all responses fall within the categories of agree and strongly agree. This indicates that system administrators considered the system to be well-designed, easy to manage, and supportive of administrative functions, reflecting overall satisfaction with its features and usability.

CONCLUSION

A data processing information system for PSHT Gondang Sragen has been developed using the EUD method. Every step in the EUD method has been applied from investigation to support system. The use of the EUD method proves that system development can be done in a relatively short time, which is around three months. System users play an active role in the development and are given convenience in modifying the system created. The system was developed using the Laravel framework and Firebase as a database. The developed system can manage registration, training centers until accepted as members. On the system homepage, you can directly see the number of active members and other data in the form of numbers or charts. Information that can be accessed by the public includes: news, galleries, brief history, organizational management, and secretariat

contacts. Testing using the black box method has been carried out on each web page and the results are as expected. For the next system development, it is necessary to create a more responsive system and addnig a feature the pudiklat assessment results so that it can be viewed transparently by all applicants.

REFERENCE

Amadi, D. N., Utomo, P., & Budiman, A. (2022). Design and Build of Road Damage Information System in Madiun Regency Using Web Development Life Cycle Methods. *Journal of Information Systems and Informatics*, *4*(4), 1112–1125. https://doi.org/10.51519/journalisi.v4i4.412

Anjarweni, R., & Erlansyah, D. (2022). Sistem Informasi Persaudaraan Setia Hati Terate (PSHT) Cabang Palembang Menggunakan Metode Prototype. *Jurnal Darma Agung*, *30*(3), 1198–1213. https://doi.org/10.46930/ojsuda.v30i3.2207

Arrosyid, A. K., Yuliawan, D., & Putra, R. P. (2024). Survei Tingkat Keterampilan Dasar Pada Siswa Usia 18-25 Tahun Pencak Silat PSHT Ranting Tarokan. *Seminar Nasional Sains, Kesehatan, Dan Pembelajaran 4*, 985–996. Retrieved from https://proceeding.unpkediri.ac.id/index.php/seinkesjar/article/view/5658

Astuti, I. F., Cahyadi, D., Kridalaksana, A. H., & Mulawarman, U. (2024). Development Of Field Work Practice Management In Informatics Integrated Service System. *PILAR*, *20*(2), 127–136. https://doi.org/10.33480/pilar.v20i2.5523

Fadlika, N. M., Mu, A., Nur, F., & Wijaya, A. (2024). Peranan Organisasi Persaudaraan Setia Hati Terate (Pencak Silat) Dalam Menumbuhkan Sikap Patriotisme Di Lingkup Kota Surakarta. *Prosiding Seminar Nasional Hukum, Bisnis, Sains Dan Teknologi*, 597–603. Surakarta. Retrieved from https://ojs.udb.ac.id/index.php/HUBISINTEK/article/view/3665

Fiki Febriani, Arri Handayani, & G.Rohastono Ajie. (2022). Pengaruh Layanan Bimbingan Kelompok Dengan Teknik Round Robin Untuk Mengembangkan Keterampilan Komunikasi Anggota Organisasi Psht Karangmoncol Kabupaten Purbalingga. *G-Couns: Jurnal Bimbingan Dan Konseling*, *7*(01), 52–58. https://doi.org/10.31316/gcouns.v7i01.4369

Fogli, D., & Tetteroo, D. (2022). End-user development for democratising artificial intelligence. *Behaviour and Information Technology*, *41*(9), 1809–1810. https://doi.org/10.1080/0144929X.2022.2100974

Malizia, A., Valtolina, S., Serrano, A., & Maceli, M. (2021). End-user development for smart environments (EUD4SE). *Behaviour and Information Technology*, *40*(10), 973. https://doi.org/10.1080/0144929X.2021.1964716

Modesto, A. S. C., Figueiredo, R. M. d. C., Ramos, C. S., Santos, L. de S., Venson, E., & Pedrosa, G. V. (2021). Organizational strategies for end-user development-a systematic literature mapping. *Informatics*, *8*(1), 1–23. https://doi.org/10.3390/informatics8010015

Nugroho, H., Gontara, S. Y., Angga, P. D., Jariono, G., & Maghribi, I. L. (2021). Quality Of Physical Condition Of Youth Pencak Silat Athletes Reviewed From Speed, Power, and Strength. *Kinestetik : Jurnal Ilmiah Pendidikan Jasmani*, *5*(1), 154–162. https://doi.org/10.33369/jk.v5i1.14376

Nurafifah, I., Hidayat, Y., & Rahmat, A. (2024). Analisis Aspek-Aspek Psikologis Siswa-Atlet Pencak Silat Di Kabupaten Subang. *Gelanggang Olahraga*, *8*(1), 20–29. https://doi.org/10.31539/jpjo.v8i1.11397

Ponce, V., & Abdulrazak, B. (2022). applied sciences Context-Aware End-User Development Review. *Appl. Sci.*, *12*(479), 1–29. https://doi.org/https://doi.org/10.3390/app12010479

Qutrotunaini, S., Nurrachmad, L., & Anam, K. (2022). Identifying Strategies to Improve Pencak Silat Achievement : A Qualitative Study. *Jurnal Pendidikan Jasmani Dan Olahraga*, *7*(1), 202–210. https://doi.org/https://doi.org/10.17509/jpjo.v7i2.49825

Rachman, J. B., Adityani, S., Suryadipura, D., Utama, B. P., Sutantri, S. C., Novalini, M. R., & Padjadjaran, U. (2021). Sosialisasi Pelestarian Pencak Silat Sebagai Warisan Budaya Dan Soft Power Indonesia. *Transformasi: Jurnal Pengabdian Masyarakat*, *17*(2), 207–219. https://doi.org/https://doi.org/10.20414/transformasi.v17i2.3999

Risqi, S., Suryadilaga, W., Raras, C., Dwi, A., & Fauziyah, S. (2024). Optimizing Early Childhood Education Management : Designing Sispaud KB Ananda Using End User Development (EUD) Method. *JINAV: Journal of Information and Visualization*, *5*(1),

21–43. https://doi.org/https://doi.org/10.35877/454RI.jinav2339

Saputri, S. D., Firdaus, M., & Kurniawan, W. P. (2024). Persepsi Masyarakat Terhadap Konflik Antar Organisasi Pencak Silat Di Wilayah Kecamatan Ngadiluwih Kab. Kediri. *Seminar Nasional Sains, Kesehatan, Dan Pembelajaran 4*, *4*(1), 823–833. Retrieved from https://proceeding.unpkediri.ac.id/index.php/seinkesjar/article/view/5636

Schenkenfelder, B., Brandstätter, U., Kirchtag, H., & Wimmer, M. (2024). Low-Code Development and End-User Development: (How) Are They Different?. In *CEUR Workshop Proceedings Proceedings of the First International Workshop on Participatory Design & End-User Development - Building Bridges co-located with the International Nordic Conference on Human-Computer Interaction (NordiCHI 2024)*(pp. *3778*).

Sinulingga, A., Kasih, I., Hasibuan, S., Daulay, D. E., & Abdullah, N. M. (2024). Unveiling technology's integral role in pencak silat: A systematic literature review. *Journal Sport Area*, *9*(1), 20–29. https://doi.org/https://doi.org/10.25299/sportarea.2023.vol9(1).14700

Vaiani, G., & Paternò, F. (2024). End-User Development for Human-Robot Interaction: Results and Trends in an Emerging Field. *Proceedings of the ACM on Human-Computer Interaction*, *8*(EICS), 252:1-252:40. https://doi.org/10.1145/3661146

Wardana, A. K., & Aribowo, E. (2021). Pencak Silat Tournament Information System. *Telematika*, *18*(1), 131. https://doi.org/10.31315/telematika.v18i1.4247

Wiguno, L. T. H., Kurniawan, A. W., Wahyudi, H., Puspitasari, D. F., & Salamuddin, N. (2024). Development of Basic Pencak Silat Techniques for High School Students. *JOSSAE (Journal of Sport Science and Education)*, *9*(1), 72–82. https://doi.org/10.26740/jossae.v9n1.p72-82