Jurnal Teknik Informatika (JUTIF)
Vol. 3, No. 1, Februari 2022, hlm. 37-44

DOI : https://doi.org/10.20884/1.jutif.2022.3.1.123
p-ISSN: 2723-3863
e-ISSN: 2723-3871

INFORMATION SYSTEM FOR MONITORING COMMUNITY PARTICIPANT PROGRAM SERVICES IN THE COVID-19 PANDEMIC ERA

Bangun Wijayanto[1], Yogiek Indra Kurniawan[2], Teguh Cahyono[3], Indra Permana Jati[4]

[1,2,3,4] Informatics Department, Universitas Jenderal Soedirman, Indonesia
Email: [1]bangun.wijayanto@unsoed.ac.id, [2]yogiek@unsoed.ac.id, [3]teguh_c@unsoed.ac.id, [4]indrapermanajatimt@yahoo.co.id

(Naskah masuk: 24 Januari 2022, Revisi : 7 Februari 2022, diterbitkan: 25 Februari 2022)

Abstrak

Community Participant Program Services (In Indonesia: Kuliah Kerja Nyata/KKN) is an activity that must be carried out by final year students in Indonesia. Community Participant Program Services are intended so that students can apply the knowledge gained in lectures to people's lives. The Covid-19 pandemic made all available resources mobilized to be able to cope with the pandemic that occurred, Community Participant Program Services were directed by the Indonesian Ministry of Education and Culture to be able to help the situation by making Community Participant Program Services in the form of Covid 19 volunteers. Indonesia is an archipelagic country consisting of 33 provinces and more than 17000 islands with diverse geographical contours and unattended telecommunication facilities in all locations requiring a volunteer monitoring system that is simple, effective, and easy to use. The system proposed in this research is based on telegram which has the advantage of ease and speed of development in adapting to changes in the rules that apply during the epidemic period. This research has contributed to monitoring the activities and health of the 2847 Covid-19 volunteers from Universitas Jenderal Soedirman who are scattered throughout Indonesia and facilitating decision

Keywords: Comunity Participant Program, Covid 19, Pandemic, Information System, Telegram

1. INTRODUCTION

Community Participant Program Services (In Indonesia: Kuliah Kerja Nyata/KKN) is an activity that must be carried out by final year students in Indonesia. Community Participant Program Services are intended so that students can apply the knowledge gained in lectures to people's lives [1]. This Community Participant Program Services (In Indonesia: Kuliah Kerja Nyata/KKN) is carried out by sending students who have met the requirements to locations that have been determined by the university. The specified locations are scattered throughout Indonesia.

In March 2020 the corona pandemic (Covid-19) entered Indonesian territory [2]. COVID-19 is an infectious disease caused by a newly discovered type of coronavirus. This is a new virus and a previously unknown disease before the outbreak in Wuhan, China, in December 2019 [3-5] . The Covid-19 pandemic made all available resources to be able to cope with the pandemic that occurred. Community Participant Program Services (KKN/Kuliah Kerja Nyata) activities are directed by the Ministry of Education and Culture of Indonesia to be able to help the existing situation by making KKN in the form of Covid-19 Volunteers.

Universitas Jenderal Soedirman as one of the organizers of the Community Participant Program Services also organizes Covid-19 KKN activities. Registered participants are distributed in various regions to help the community and health services in the response to COVID-19. To be able to reduce and break the chain of the spread of Covid-19 in Indonesia, the government issued a large-scale social restrictions policy (PSBB)[6,7]. With the large-scale social restrictions (PSBB) by the government, the sending of Covid-19 KKN participants was carried out based on the residence of students who registered as participants.

An information system (IS) is a set of interrelated elements or components that collect (input), manipulate (process), store, and disseminate (output) data and information and provide corrective reactions (feedback mechanisms) to meet objectives. Feedback mechanisms are components that help organizations achieve their goals, such as improving customer service [8,9]. Selection of Information Systems depends not only on results (price, duration of acquisition period, strategy for developing information systems), but also on its properties (system architecture; scalability; reliability; ease of implementation; replication; supported interfaces for integration with external systems) and system functions information [10]

The KKN Information System created in previous studies was developed in a web-based

system. The use of a web-based system besides requiring large data transfers also cannot be used to monitor the real-time position of KKN participants. In this study, the use of mobile-based applications was selected with the consideration that the percentage of the population using cellular phones in Indonesia continues to increase, until in 2017 it reached 59.59 percent. The growth in the use of cellular phones was also followed by the growth of internet use in households which reached 57.33 percent, while computer ownership decreased to 19.11, the community began to switch to using cellular phones to access information [11]. The use of native applications is still the best choice for hardware intensive applications compared to web applications[12].

Danzen in 2017 has made an Android-based KKN reporting system application, the results of Danzen's research stated that only around 79.26% of KKN participants can use Android-based applications, this is because not all participants use Android-based smart phones[13]. Alsaeedy in 2020 has researched research on the detection of areas at risk of spreading covid-19 using cellular signals and network functionality. The study concluded that the frequency of handover (HO) and cell (re) selection (CS) will reflect the risk of movement in an area. Alsaeedy research can provide a model for measuring the dangers of the spread of Covid-19 through the movement of the user's cellphone[14], however, it cannot solve the problem when the zone has been mapped by the government and personal health data from users is not recorded.

The aim of this research is to create a simple KKN monitoring information system that can be used by participants that are scattered throughout Indonesia, where Indonesia is an archipelago consisting of 33 provinces and more than 17,000 islands with diverse geographical contours coupled with the dynamic changes in regulations regarding Covid-19 by the government in a fast, efficient and reliable manner (can run on a smartphone with various operating systems).

2. RESEARCH METHOD

The development of the Covid-19 KKN participant monitoring system uses the waterfall method, this model is a classic model that is systematic and sequential in software development starting from analysis, design, coding, and testing [15-18].

The process carried out at this stage consists of:

a. Analysis

At this stage an analysis is carried out on the need for a telegram-based KKN monitoring system that can monitor student health

b. Design

Software design is a gradual process that focuses on four important parts, namely: data structure, software architecture, procedure details, and user interface characteristics. At this stage, the design of the communication model between the telegram device web server application is carried out.

c. coding

Software coding is the process of writing a program language so that the software can be run by the machine. At this stage, start implementing the design to the coding and implementation of the Telegram platform.

d. Test

This process will test the program code that has been created by focusing on the inside of the software. System testing process with hardware.

e. Maintenance

This stage is carried out after the prototype can be successfully made and tested for further use as an initial model

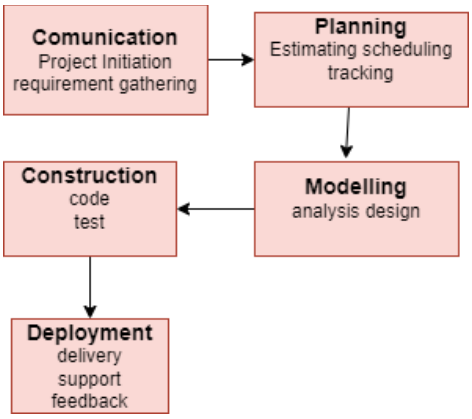

Figure 1. Waterfall Development Model

Figure 1 shows the waterfall stages carried out in system development. The system development process starts from communication with the business process owner, planning and scheduling, modeling, code generation, and testing, system deployment.

3. PROPOSED SYSTEM

Regulations regarding social distancing and health protocols are very dynamic, requiring applications to be developed and distributed quickly and under government regulations. Mobile-based application development with leading operating system platforms such as Android and iOS has weaknesses in the application distribution process to users. During the pandemic, Android apps will appear in the Playstore after a week or more, while apps on iOS will appear in the Apple Store after 48 hours[19,20]. With such conditions, changes that occur to business processes cannot be done quickly.

The system proposed as a solution is a monitoring system based on the Telegram bot application. Even though WhatsApp has 60% popularity among smartphone users, in terms of security it would be wiser to use Telegram as a platform[21]. Telegram as an open-source platform

supports various operating systems such as Android, Windows / Mac / Linux, macOS [22].

Telegram as a platform has many advantages including the ease with which developers can develop applications in the form of bots [23,24]. Bots made on the Telegram platform will make it easier for users when there are changes to existing rules and business processes. Developers will find it easier to make updates when changes occur that require speed of time and implementation.

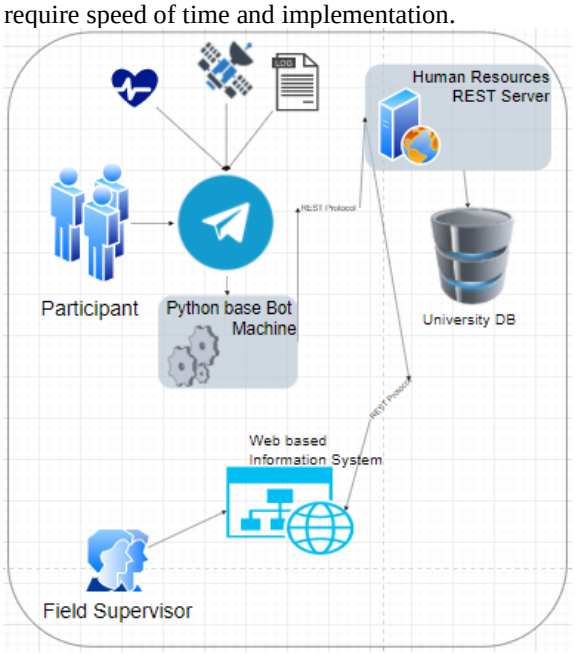

Figure 2. The general architecture of the proposed system

Figure 2 shows the general architecture of the proposed system. Participants will send their position, health, and daily activity logs through the telegram application. Telegram then forwards the report to the bot it has developed. The Telegram application bot is connected to a data server using REST (Representational State Transfer) technology to the university's resource database. The REST protocol is also used on the web-based application side to display monitoring data to be monitored by the field supervisor.

System development begins by analyzing the KKN process that took place during the pandemic. The results of the interview obtained the workflow of KKN during the pandemic as follows, the KKN process begins with participant registration. Registration of participants is done manually, participants submit themselves by sending registration documents to the Universitas Jenderal Soedirman (Unsoed) LPPM (Institute for Research & Community Service), then LPPM Unsoed will select the submitted documents based on predetermined requirements. Participants who meet the requirements will then be assigned to a field supervisor who has been appointed by the LPPM. The data from the KKN registrants will then be stored in the KKN participant database. The results of the analysis are then written into the flow map as shown in Figure 3.

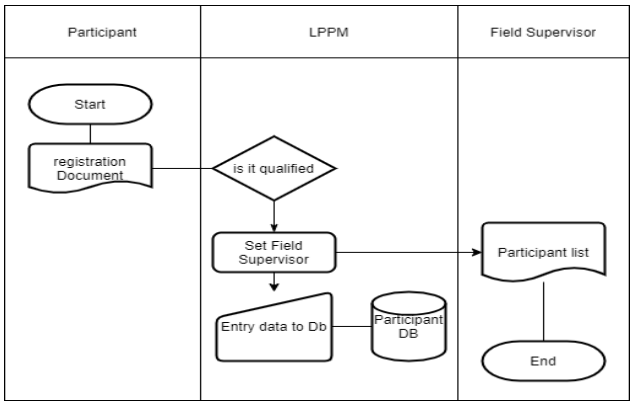

Figure 3. Flow map of the Covid-19 KKN registration diagram

From the flow map in Figure 3 an analysis can be carried out of the actors involved in the KKN system that will be developed. Figure 4 shows the general usecase of the system to be made

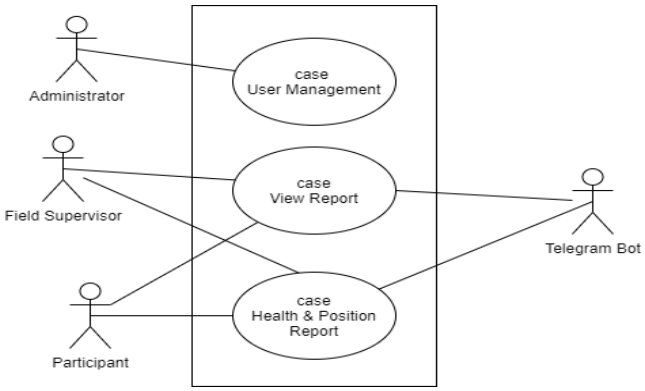

Figure 4. General usecase of the system

The main actors in the system to be developed consist of Administrators (LPPM Unsoed), Field Supervisors, and Participants. Table 1 shows the results of the analysis of user requirements.

Table 1. User Requirements

Code	Users	User Requirements
UR-01	Administrator	Perform KKN participant data management
UR-02	Field Supervisor	Evaluating the performance of KKN participants and monitoring health
UR-03	KKN Participant	Report the location of KKN as well as health and daily work achievements

Analysis of system requirements is shown in table 2

Table 2. System Requirements

Code	System Requirements
SRS-01	The system can be accessed safely and easily
SRS-02	System development and updating can be done quickly and measurably
SRS-03	The system can be used on participant's devices easily and is compatible with commonly used devices (Android or iPhone)
SRS-04	The system can provide daily performance reporting facilities
SRS-05	The system can provide facilities for reporting the health conditions of participants
SRS-06	The system can provide information on the geographical position of the participants
SRS-07	The system can broadcast various information from the university to all participants
SRS-08	The system uses the minimum data size due to geographical conditions and participant communication network facilities
SRS-09	The system is developed as much as possible not burdening the storage capacity of the user

3.1. REST Server

REST is the architecture of a communication method that generally uses the HTTP protocol to create and manage data communications so that the system can have good performance and is easy to develop[25,26]. REST itself was created by Roy Fielding from the University of California [27]. Rest is a web service that is simplified and lighter than SOAP [28]. REST separates client and server, client and server have different and separate duties and responsibilities. Every request that comes from the client will have all the information needed to serve the request. The response that will be received by the client will be based on the request [29].

REST which was developed based on the CodeIgniter framework has a function as a resource provider in the form of data / information derived from databases. CodeIgniter is a very lightweight, high-performance, and open-source PHP framework for developing websites in the Model-View-Controller architecture[30,31].

The API addresses provided by the REST server that have been created and their functions are shown in table 3.

Table 3. API provided by the REST server

Alamat	Method	Description
/API/participant	Get	The API used to get information from participant based on registered idtelegram
	Push	API used to store participant data into the database
	Put	The API is used to update data / information from participants
	Del	API used to remove participant data from the database
/API/monitor	Get	The API is used to get information from participants based on the field supervisor who accesses it
	Push	The API is used to store field supervisor approval data for participant reports into the database
/API/health	Get	The API is used to get data / information about the health status of participants based on certain telegram id
	Push	API used to store participant health status data based on telegram id
/API/presence	Get	The API is used to get data / information about the attendance of participants at a location based on a certain telegram id
	Push	API that is used to store participant location data when carrying out activities

Access to the API address can be done in various programming languages. Figure 5 shows API calls in Python

```
import requests
url = 'localhost/api/participant?key=90789'
headers = {}
response = requests.request('GET', url, headers =
headers, data = payload, files = files,
allow_redirects=False, timeout=undefined,
allow_redirects=false)
print(response.text)
```

Figure 5. API calls in the Python programming language

3.2. Python Bot Application

The Bot application functions as a middleware that will process each input obtained from the telegram to be processed and saved to the database using the REST protocol. Telegram bots communicate with telegram servers using an API identified with a token generated from Bot Father (an application for bot development provided by telegram) [32]. The bot software implementation is done using the python programming language. Python is a multi-purpose interpretive programming language with a design philosophy that focuses on the readability of the code [33,34]. The Bot application is tasked with processing data by UR-04 user requirements and system requirements (SRS-01 to SRS-10). The process of each activity carried out can be explained as follows:

3.2.1. Participant Registration Activity Process

The participant registration process is a participant re-registration process which includes verification of the cellphone and telegram used into the existing system. As explained in the flow map figure 1, volunteers who will be sent to the location have been registered in advance through administrative selection through the required documents.

Figure 6 shows a sequence diagram of the processes that occur. Participants will communicate with the Bot that has been made via the telegram application, to register the participant will type /start on the telegram, then the bot will respond by displaying a data verification interface. By using the interface that has been created, the volunteer will send the cellphone number of the telegram used and also the registration number obtained when doing manual registration.

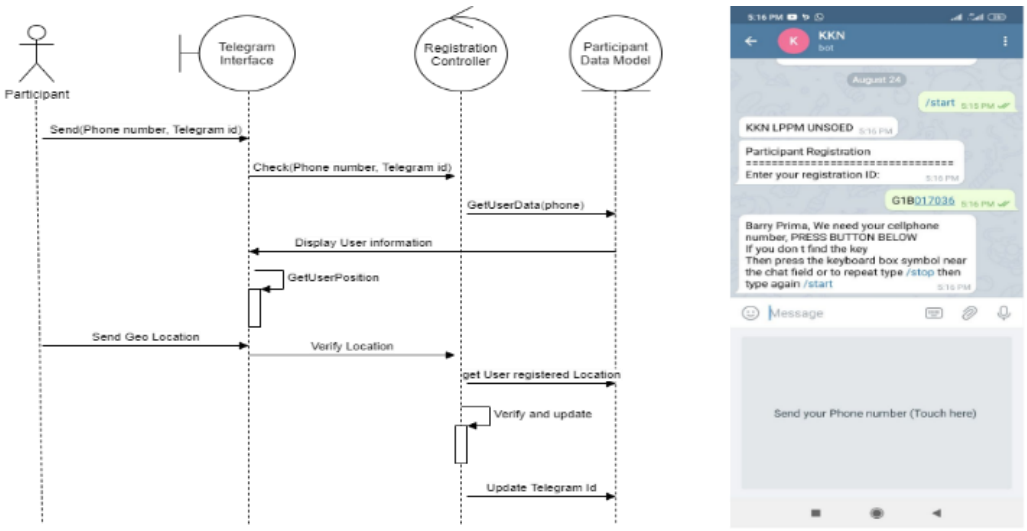

Figure 6. Participant Registration Sequence Diagram and implementation on Telegram

After the participant sends the location of their assignment, the bot will save it to the database through the data model with the available REST protocol as shown in table 3 previously.

3.2.2. Participant Attendance Reporting Activity Process

The presence of participants at the KKN location is always monitored by field supervisors, this is so that the program plans that have been prepared can be achieved properly. This participant attendance reporting activity is carried out by participants who have registered in section 4.2.1 by typing the / presence command.

After the user sends the / presence command, the bot will then give a reply in the form of a button display to send the participant's current location, the bot through the presence controller will then save the participant's location to the data model based on the participant's telegram id.

In addition to reporting attendance at the location of assignments, participants are also

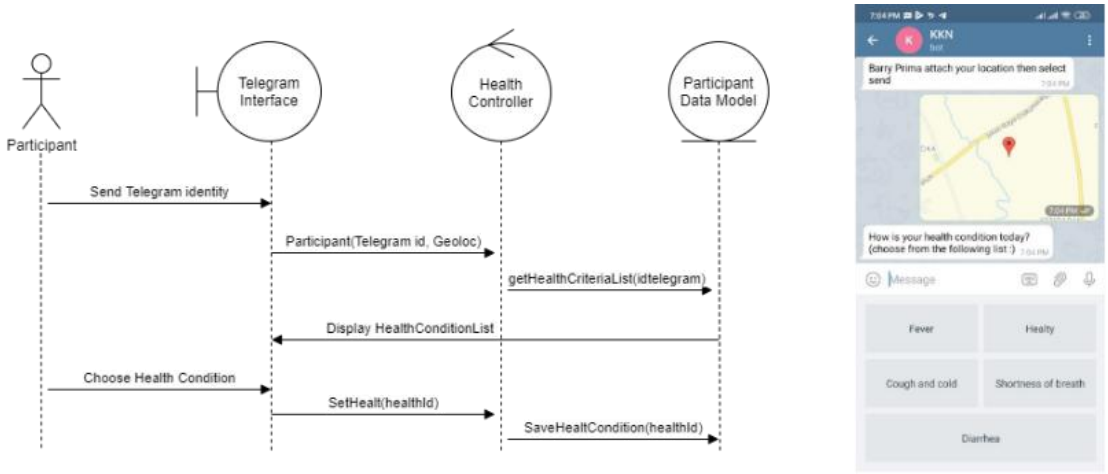

Figure 7. Sequence Diagram for Participant Health Report and implementation in Telegram

required to report their health conditions, especially for participants who are assigned to risk zones so that their health status can be monitored periodically to be able to provide accurate and fast decisions. Figure 7 shows a sequence diagram of the health status reporting process.

Participants access this menu by sending the command / health on telegram then the bot will retrieve a list of health status that has been set by the administrator. Participants can then choose the health status in the available interface and then the health controller on the bot will save the existing data into the data model.

3.2.3. Participant Log Book Reporting Activity Process

Log Book reports are carried out every day by participants with the aim that field supervisors can find out about the progress of the work done by participants.Figure 8 shows a sequence diagram of the participant's daily log reporting process. Participants will send commands / logs then the telegram bot will ask the user to write down the activities carried out, using the Log Controller the bot will save the data into the data model.

3.3. Web-Based Application

Web-based applications are used by administrators and field supervisors. As illustrated in Figure 4, this web application uses the REST protocol to communicate data with the university database server. Figure 9 shows a participant's real-time monitoring dashboard that can be accessed by field supervisors.

A field supervisor can see the participant's real-time location, the field supervisor can also access the health conditions and activities carried out by participants by pointing the pointer to the desired participant. Field supervisors can also send messages directly to the intended participants, as well as broadcast messages to all participants.

4. Result and Discussion

For 3 months the system was used to monitor the participants, the system had served 3197 participants, the number of requests handled by the bot was 182,426 requests with the waiting time for bot users to get an average response of 2s per request.

The distribution of participant reports is evenly distributed throughout Indonesia, proving that the application has been successfully designed to run in areas that have telecommunications networks with limited data speeds. The use of applications has made communication easier between volunteers and field supervisors without physical contact during the Covid-19 pandemic.

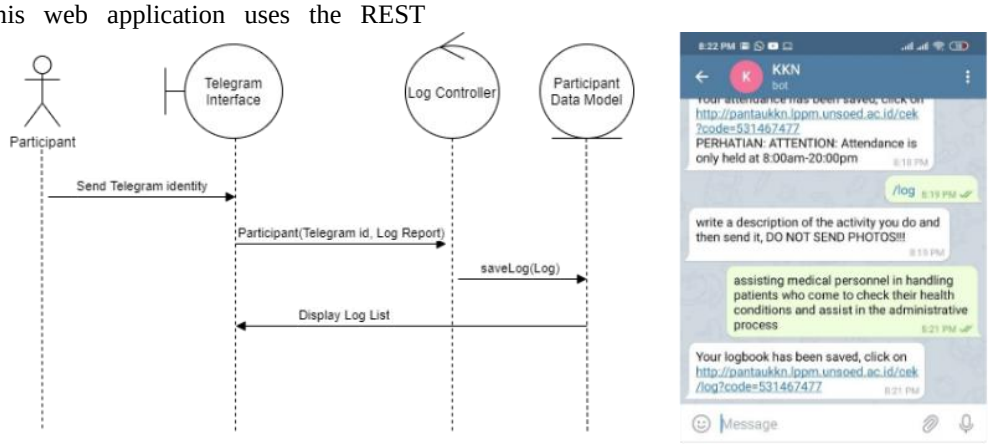

Figure 8. Sequence Diagram Participant Log Book and implementation in Telegram

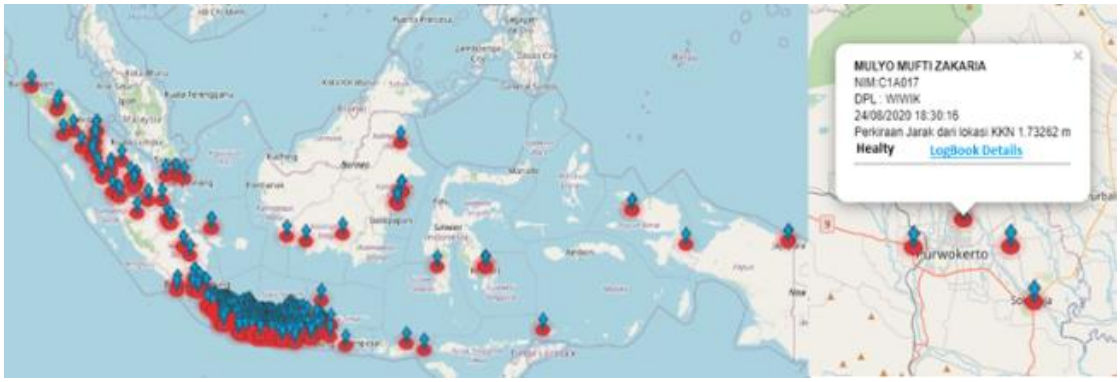

Figure 9. Real-time monitoring of the distribution of Covid-19 KKN participants

5. Conclusion

The system has been successfully created and meets all user requirements and system requirements. The use of this system has helped in monitoring participants both activities, health, and attendance at the assignment location during the pandemic period. However the system has not facilitated the recording of participants' trips from one zone to another due to privacy issues.

REFERENCES

[1] G. Fandatiar, S. Supriyono, and F. Nugraha, "Rancang Bangun Sistem Informasi Kuliah Kerja Nyata (Kkn) Pada Universitas Muria Kudus," *Simetris J. Tek. Mesin, Elektro dan Ilmu Komput.*, vol. 6, no. 1, p. 129, 2015, doi: 10.24176/simet.v6i1.247.

[2] R. Djalante *et al.*, "Review and analysis of current responses to COVID-19 in Indonesia: Period of January to March 2020," *Prog. Disaster Sci.*, vol. 6, p. 100091, 2020, doi: 10.1016/j.pdisas.2020.100091.

[3] WHO, "coronaviruses (COVID-19)," 2020. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/q-a-coronaviruses (accessed Jul. 27, 2020).

[4] J. P. Narain, N. Dawa, and R. Bhatia, "Health System Response to COVID-19 and Future Pandemics," *J. Health Manag.*, vol. 22, no. 2, pp. 138–145, 2020, doi: 10.1177/0972063420935538.

[5] B. Yan, X. Zhang, L. Wu, H. Zhu, and B. Chen, "Why Do Countries Respond Differently to COVID-19? A Comparative Study of Sweden, China, France, and Japan," *Am. Rev. Public Adm.*, 2020, doi: 10.1177/0275074020942445.

[6] R. Nasruddin and I. Haq, "Pembatasan Sosial Berskala Besar (PSBB) dan Masyarakat Berpenghasilan Rendah," *SALAM J. Sos. dan Budaya Syar-i*, vol. 7, no. 7, 2020, doi: 10.15408/sjsbs.v7i7.15569.

[7] A. Ristyawati, "Efektifitas Kebijakan Pembatasan Sosial Berskala Besar Dalam Masa Pandemi Corona Virus 2019 oleh Pemerintah Sesuai Amanat UUD NRI Tahun 1945," *Adm. Law Gov. J.*, vol. 3, no. 2, pp. 240–249, 2020, doi: 10.14710/ALJ.V3I2.240-249.

[8] Ralph M. Stair and George W. Reynolds, *Principles of Information System*, 10E ed. Boston, USA: Course Technology, 2012.

[9] M. Aboaoga, M. J. A. Aziz, and I. Mohamed, "Information system success framework based on interpersonal conflict factors," *Int. J. Electr. Comput. Eng.*, vol. 8, no. 5, pp. 3740–3746, 2018, doi: 10.11591/ijece.v8i5.pp3740-3746.

[10] A. I. Urintsov, O. V. Staroverova, N. A. Mamedova, M. A. Afanasev, and M. S. Klyachin, "Consulting of Choice of Information System in the Conditions of Digital Transformation of Business," *Proc. 2019 IEEE Int. Conf. Qual. Manag. Transp. Inf. Secur. Inf. Technol. IT QM IS 2019*, pp. 167–169, 2019, doi: 10.1109/ITQMIS.2019.8928307.

[11] Badan Pusat Statistik, *Statistik Telekomunikasi Indonesia*. Jakarta, Indonesia: Badan Pusat Statistik, 2017.

[12] W. Jobe, "Native Apps Vs. Mobile Web Apps," *Int. J. Interact. Mob. Technol.*, vol. 7, no. 4, p. 27, 2013, doi: 10.3991/ijim.v7i4.3226.

[13] D. Permana and A. Aristoteles, "Pengembagan Sistem Pelaporan Kegiatan Kkn Berbasis Android," *J. Komputasi*, vol. 5, no. 1, pp. 8–16, 2017, doi: 10.23960/komputasi.v5i1.1402.

[14] A. A. R. Alsaeedy and E. Chong, "Detecting Regions At Risk for Spreading COVID-19 Using Existing Cellular Wireless Network Functionalities," *IEEE Open J. Eng. Med. Biol.*, vol. 1, pp. 1–1, 2020, doi: 10.1109/ojemb.2020.3002447.

[15] R. S. Pressman, *Software Engineering: A Practitioner's Approach*, 7th ed. New York, USA: McGraw-Hill Education, 2014.

[16] Y. Bassil, "A Simulation Model for the Waterfall Software Development Life Cycle," vol. 2, no. 5, 2012, [Online]. Available: http://arxiv.org/abs/1205.6904.

[17] V. Kannan, S. Jhajharia, and S. Verma, "Agile vs waterfall : A Comparative Analysis," *Int. J. Sci. Eng. Technol. Res.*, vol. 3, no. 10, pp. 2680–2686, 2014.

[18] R. H. Kulkarni, P. Padmanabham, and K. K. Baseer, "Critical Review of Extended Waterfall Model," *Int. J. Sci. Eng. Res.*, vol. 6, no. 11, pp. 425–432, 2015.

[19] Sarah Perez, "Android app reviews may slow to over a week due to COVID-19 impacts, Google warns developers," 2020. https://techcrunch.com/2020/03/17/android-app-reviews-may-slow-to-over-a-week-due-to-covid-19-impacts-google-warns-developers/ (accessed Sep. 09, 2020).

[20] Apple, "App Review," *2020*. https://developer.apple.com/app-store/review/ (accessed Sep. 09, 2020).

[21] T. Sutikno, L. Handayani, D. Stiawan, M. A. Riyadi, and I. M. I. Subroto, "WhatsApp, viber and telegram: Which is the best for instant messaging?," *Int. J. Electr. Comput. Eng.*, vol. 6, no. 3, pp. 909–914, 2016, doi: 10.11591/ijece.v6i3.10271.

[22] Telegram, "Telegram Applications," 2020. .

[23] B. N. Prastowo, N. A. S. Putro, and O. A. Dhewa, "PLO User Interface based on Telegram Bot," *IJCCS (Indonesian J. Comput. Cybern. Syst.*, vol. 13, no. 1, p. 21, 2019, doi: 10.22146/ijccs.29089.

[24] R. Rianto, A. Rahmatulloh, and T. A. Firmansah, "Telegram Bot Implementation in Academic Information Services with The Forward Chaining Method," *Vol 3 No 2 Sink. Vol. 3 Number 2, April 2019*, vol. 3, no. March, p. Rianto, R., Rahmatulloh, A., Firmansah, T. (2019, 2019, doi: 10.33395/sinkron.v3i2.10023.

[25] Naren Yellavula, *Building RESTful Web services with Go*. Birmingham: Packt, 2017.

[26] I. B. P. Manuaba and E. Rudiastini, "API REST Web service and backend system of Lecturer's Assessment Information System on Politeknik Negeri Bali," *J. Phys. Conf. Ser.*, vol. 953, no. 1, 2018, doi: 10.1088/1742-6596/953/1/012069.

[27] H. Li, "RESTful Web service frameworks in Java," *2011 IEEE Int. Conf. Signal Process. Commun. Comput. ICSPCC 2011*, no. 1, 2011, doi: 10.1109/ICSPCC.2011.6061739.

[28] D. M. Rathod, M. S. Dahiya, and S. M. Parikh, "Towards composition of RESTful web services," *6th Int. Conf. Comput. Commun. Netw. Technol. ICCCNT 2015*, 2016, doi: 10.1109/ICCCNT.2015.7395237.

[29] Haafiz Waheed-ud-din Ahmad, *Building RESTful Web Services with PHP 7*. Birmingham: Packt, 2017.

[30] D. G. R. N. Dr. Poornima G. Naik, *Enhancing PHP Coding with CodeIgniter: Hands-on Experience with CodeIgniter*. New Delhi: Educreation Publishing, 2019.

[31] H. Hustinawati, A. Kurnia Himawan, and L. Latifah, "Performance Analysis Framework Codeigniter and CakePHP in Website Creation," *Int. J. Comput. Appl.*, vol. 94, no. 20, pp. 6–11, 2014, doi: 10.5120/16549-5946.

[32] Telegram, "Bots: An introduction for developers," 2020. https://core.telegram.org/bots (accessed Aug. 24, 2020).

[33] Python, "General Python," 2020. https://docs.python.org/3/faq/general.html#what-is-python-good-for (accessed Aug. 24, 2020).

[34] K. Adawadkar, "Python Programming-Applications and Future," *Int. J. Adv. Eng. Res. Dev.*, vol. 4, no. 04, pp. 1–4, 2017, doi: 10.21090/ijaerd.it032.