



Development of an Android-Based Attendance Information System Utilizing QR Code for the Forum of Planned Generation in Bengkulu Province

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Abstract

This research focuses on the development of an Android-based attendance information system using QR Code at the Generasi Berencana Forum in Bengkulu Province. The inefficiency and inaccuracy of data in the manual attendance system used lead to resource wastage and delays in reporting. This issue prompted the author to design a more effective solution by utilizing QR Code technology. The main objective of this research is to create an attendance system that is fast, accurate, and efficient, which can reduce human error and simplify the processing of attendance data. Using a descriptive method with a prototyping approach, which allows for iterative and responsive system development to user needs. The research results show that the QR Code-based attendance system can accelerate the attendance process and improve data accuracy. Participant attendance is automatically stored in an integrated database, thus facilitating reporting without repeated manual input processes. The implementation of this system not only increases efficiency and effectiveness, but also offers ease of use for officers and participants. This research is expected to serve as a foundation for the development of additional features, such as security and geolocation tracking, in the future.

Keywords: Attendance, Android, Information System, Prototype, QR Code.

1. Introduction

Information technology is a tool that is used to facilitate, accelerate, and organize work[1]. Technological developments have changed the work paradigm in various institutions and organizations, encouraging efficiency, accuracy, and speed in administrative management. One of the aspects affected is the attendance system, which was previously done manually using paper and attendance lists, has now switched to a digital system. Some examples of attendance technology that are widely used include fingerprint presence which utilizes biometrics to ensure the authenticity of identity despite limitations in storage capacity and hygienic risks. There is also a web/android-based presence that allows for flexible access from anywhere, but requires a stable internet connection. Android is a software used on mobile devices that includes the operating system, middleware, and basic applications[2]. Among the various options that exist, the use of QR Codes is emerging as an efficient alternative, affordable, and capable of storing a lot of information [3]. QR is an advanced evolution of barcodes. A barcode is a mark that identifies a product or object [4].

Attendance is an activity to collect data that aims to find out how many people are present at an event[5]. QR Code Attendance Recording Application is one type of application for recording attendance. Attendance refers to the presence or absence status of a person or object within an institution, which requires a report on the number of attendance and absences. In addition, attendance recording also serves as a means to enforce discipline within institutions or organizations[6]. QR Code technology was chosen because it has several advantages over other methods. First, the scanning speed allows the attendance process to be carried out in seconds. Second, the data capacity that can store more information than conventional barcodes. Third, the lack of human error because this system reduces the risk of data input errors that often occur in manual attendance.

Based on a study that has been conducted previously entitled Analysis and Design of Attendance Systems with the Utilization of QR Codes and BYOD Methods, it was found that the attendance recording process is faster and more efficient because it can be carried out simultaneously [7]. The next study on Web-Based Attendance Applications that Utilize QR Codes with the Waterfall Method in Cv. Ap Consultant and Contractor showed the results of the analysis showing that this attendance application is effective in making it easier for admins or employees to obtain information and submit attendance reports more simply[8]. In a subsequent study on the Design of an Online Attendance System using QR Codes with a Prototyping Approach, it was shown that attendance applications that use QR codes can meet expectations, because they succeed in speeding up and simplifying the attendance process. However, this can also make attendance identification risky to security threats, such as forgery or QR code changes [9]. In addition, in a study on the Design of an Automatic Student Attendance System Using Smart QR Cards with the BCRYPT Algorithm, it was concluded from the discussion that this system can prevent fraud between students in terms of attendance keeping. In addition, securing data through the process of password encryption

is a step to prevent information theft [10]. Subsequent research on the use of QR Code Geolocation for lecturer attendance at the Faculty of Engineering, University of Muhammadiyah Bengkulu showed that the results of this study provided information about attendance with an evaluation system success rate of 85% [11].

Based on the author's observations, the manual attendance system that is still used at the Generation Planning Forum causes several significant problems. First, the time inefficiency due to the process of filling out the manual attendance list takes longer, especially when the number of participants is large. Second, data inaccuracies that are prone to duplication, name misspellings, or even attendance manipulation. Third, waste of resources due to the use of paper that is not environmentally friendly and high operational costs. Fourth, delays in reporting because attendance data must be re-input into the digital system, thus hindering the process of evaluating activities.

These problems show that manual systems are no longer relevant to the needs of modern organizations that demand speed and accuracy. One way to improve this attendance information system is to utilize QR Codes [12]. In this context, QR Code presence is an effective solution for several reasons. First, the data stored in real-time in the database facilitates the monitoring process. Second, there is a trail audit that minimizes fraud because each attendance is recorded with a timestamp. Third, the scalability of the system that is able to handle a large number of participants without requiring significant additional costs.

With these problems, the author offers a solution in the form of developing an attendance system through the Design of an Android-Based Attendance Information System Using QR Codes at the Generation Planning Forum to make it easier to process attendance data at each activity. This solution provides several advantages, including process automation through a QR Code unique to each participant that ensures the authenticity of the data, as well as integration with databases that reduces the need for manual input. In terms of operational efficiency, the system saves time, costs, and resources because it is paperless, while allowing for automatic attendance reporting.) In addition, with the presence of a presence application, it will minimize the occurrence of human error, compared to manual attendance which in processing data its presence takes longer, is inefficient and effective for large numbers, wastes paper, is less accurate and is prone to fraud. In addition, the Web-Based Presence System Using QR Code provides a notification or reminder feature to encourage discipline.

2. Research Methods

The method that will be used in this study is a descriptive research method, because this method can describe a system design systematically and efficiently with the observation process, the framework offered, and the system interface to be created. And also applying the way that will be formulated in this information system is to use the prototype model, where the creation of the flow or work structure includes recognizing the user and creating a prototype.

2.1. Research Stage



Fig. 1: Research flow diagram.

Based on the research framework described above, the review of each stage in the research can be described as follows

2.1.1 Observations

Observations will be made during the conventional attendance process to understand in detail how the attendance process is currently being performed. This will help in identifying problems and needs that can be addressed by an online presence system using QR Codes

2.1.2 Problem Identification

After observing this study, the authors found that the problems faced in the generation planning forum are the attendance system that is carried out manually so that it can cause time inefficiency, inaccurate data that is prone to duplication, misspelling names, or even attendance manipulation, waste of resources due to the use of paper that is not environmentally friendly and high operational costs as well as delays in reporting because attendance data must be re-input into the digital system, thus hindering the process of evaluating activities

2.1.3 Data Collection

At this stage, the author collects data by the method of designing databases required by the attendance system through data collection, such as: officer data (administrators) and user data (GenRe ambassadors, alumni, GenRe Regency/city). After the data collection, the author immediately determines the entities and attributes that will be entered into the information system

2.1.4 System Design

At this stage, the author began to design an attendance system at the Planned Generation Forum starting from the creation of ERD, context diagrams, to interfaces that will be used as a website display and make it easier for users of the information system.

2.2. Method Prototype

A prototype model is an approach that requires software developers to create a mockup in the form of a model of an application, which is especially useful in situations where users are unable to clearly convey information about their needs that meet their expectations. A system

prototype will be developed using this prototyping method so that developers and users can communicate with each other during the process of creating an information system [13]. This method is crucial because it assists developers in finding weaknesses and making repairs before the system is fully implemented[14]. Prototyping can be used in system development, both small and large-scale, with the aim of ensuring that the development process runs well, is organized, and is completed on schedule. Full user participation when the prototype is created will benefit all parties involved, including management, the users themselves, and the system developers [15].

3. Results and Discussion

Based on the background and methods of this research, it can be concluded that the attendance system at the GenRe Forum of Bengkulu Province still uses a manual attendance system, therefore the author wants to help create an android-based attendance information system by using QR Codes that will support the attendance system to work faster and more accurately.

3.1. Proposed System Design

At this stage, the author designs a system starting from the ERD act, context diagram, to the process level diagram, and interface that will be used as a website display and make it easier for users of the information system so that it can help the process of making the system more interactive.

3.1.1 Proposed System Design

Entity Relationship Diagram in Figure 1 shows how the relationship between entities and attributes in the presence information system

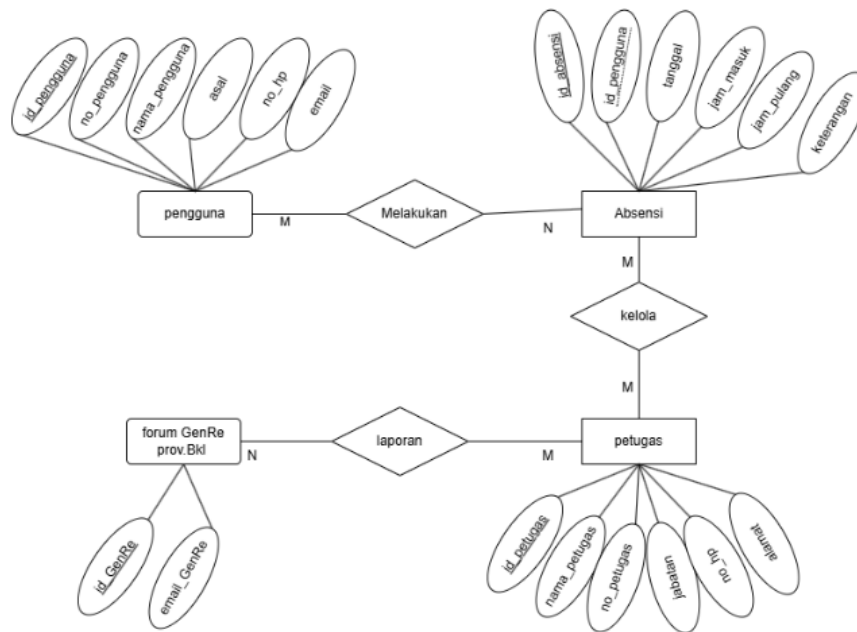


Fig. 2: Design Presence Databases

3.1.2 Data Flow Diagram (DFD)

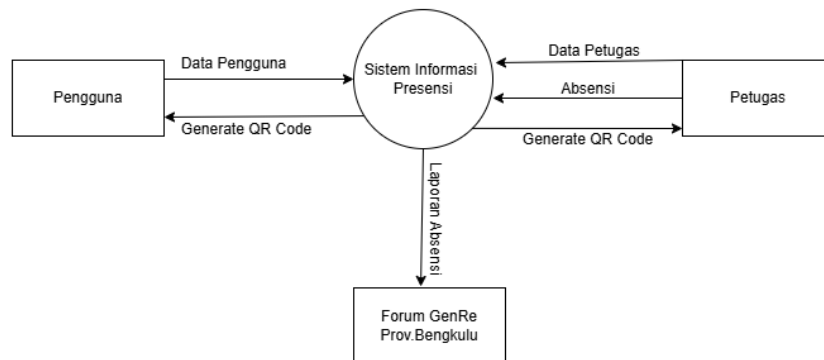


Fig. 3: The framework of the attendance system from officers (administrators), users (ambassadors, alumni, GenRe Regency/City) and the GenRe Forum prov. Bengkulu

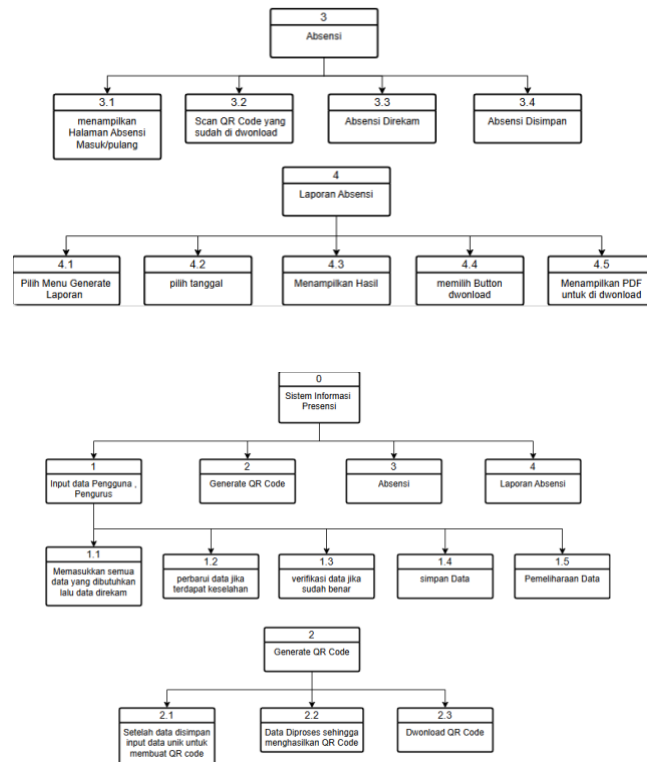


Fig. 4: Flow of the process level diagram carried out on the attendance system

3.2. Initial Interface/Display Implementation

The initial appearance or interface of the Presence information system that the author created:

3.2.1 Officer and User Login View



Fig. 5: Login view

The image above is an implementation of the page that functions as the main page for officers and users to log in to the application.

3.2.2 Officer and User Dashboard Display

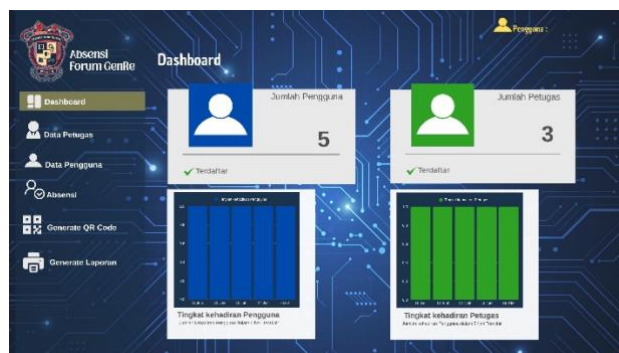


Fig. 6: Officer dashboard display

The image above is a view of the officer's dashboard page. This page is the starting page when the officer just logged into the system.



Fig. 7: User dashboard view

The image above is a view of the officer's dashboard page. This page is the starting page when the officer just logged into the system.

3.2.3 Display of Officer Data

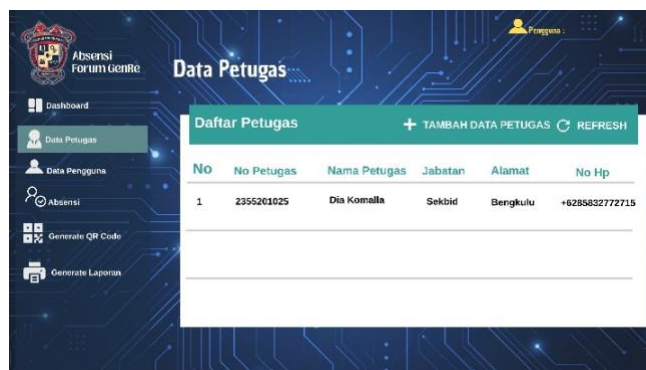


Fig. 8: Display of officer data input

The image above is a page view to input data of officers who will be present to create QR codes.

3.2.4 User Data Display



Fig. 9: User data input view

The image above is a page view to input data of users who will be present to create QR codes.

3.2.5 Display Generate QR Code

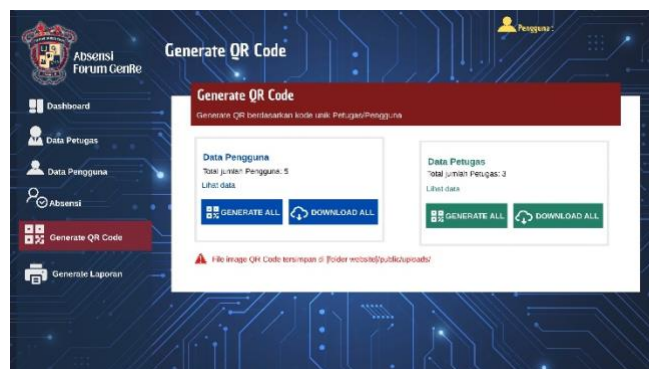


Fig. 10: Display Generate QR code

The image above is the display of the QR Barcode Retrieval page after entering data on the officer and user menu.

3.2.6 Attendance Display



Fig. 11: Attendance scan view

The image above is the display of the Scan QR Code menu page to make attendance, this page can only be accessed by officers.

3.2.7 Generate Report View

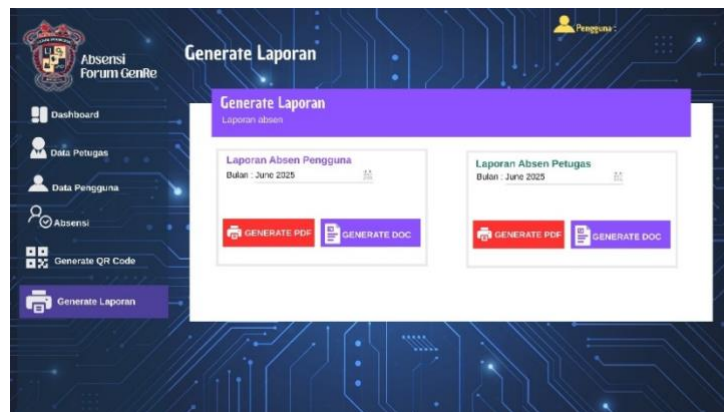


Fig. 12: Report view

Report view The image above is the display of the menu page to make an attendance report, this page can only be accessed by officers.

4. Conclusion

Based on research on the attendance information system conducted at the genre forum in Bengkulu province using QR codes, it can help speed up the presence process, data accuracy, and efficiency through scanning QR Codes that are unique to each user. Attendance data is automatically stored in an integrated database, making it easier to manage and report attendance without the need for repetitive manual input processes. With the help of the prototype method, the development of the system is carried out iteratively and responsive to user needs, resulting in an attendance application that is not only efficient in recording attendance, but also easy to use by officers and activity participants. In addition, through the application of prototype models in information systems, this is very helpful in the work of the interface or appearance of a system. Research that wants to further examine this information system is expected to be able to improve the features created by the author and can be developed with the addition of security features, geolocation tracking, and more comprehensive report integration.

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