

Analysing The Need for Innovative Staff Attendance Tracking System and Designing a Solution for Institut Bakti Nusantara

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Abstract

Attendance at an educational institution or company is important in measuring the performance and attendance of lecturers. Manual attendance at the Institut Bakti Nusantara (IBN) is still a major problem, such as time time-consuming and prone to human error. Therefore, this study aims to analyse the need for an innovative attendance tracking system and design a solution using a QR Code application for the attendance of lecturers at the IBN. Using the waterfall method which includes the stages of needs analysis, system design, application development using QR Code technology, and application testing to test system functionality. The results of this study indicate that the QR Code Presence application developed can run well according to its function such as recording the attendance of Lecturers and providing attendance reports. This study produces a product, the IBN Lecturer attendance QR Code web application that can record attendance and manage attendance data.

Keywords

QR-Code, Attendance, Application, Performance

INTRODUCTION

Nowadays, technology has become an important part of our daily lives. Technology has helped us in completing various tasks and making work easier. Technology has also helped in increasing efficiency and productivity. One of the technologies that has become popular is the QR Code. QR code technology is a two-dimensional barcode that can store various information. (Agasatya, 2021)

Attendance at an educational institution or company is very important in measuring the performance and attendance of lecturers (Jaya et al, 2024). However, manual attendance is still widely used in several institutions, which can cause complex administrative problems, is often time-consuming, and is prone to human error. In addition, manual attendance is also prone to fraud such as fake attendance or collective attendance. Institut Bakti Nusantara (IBN) is one of the educational institutions that still uses a manual attendance system. The disadvantages of this manual system include the lack of speed in the attendance process, inflexibility, and being prone

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to data manipulation and prone to miscalculation of attendance (Muhamad Adnan et al, 2024). This has an impact on time efficiency, accuracy, and security in the administration process. Therefore, from the discussion and background above, the research question in this study is how to develop a QR Code application for Lecturer Attendance at Institut Bakti Nusantara. To overcome this problem, a QR Code-based attendance application is needed that can help IBN lecturers to do attendance faster, safer, and more efficiently. This study aims to develop a QR Code-based attendance application to help IBN Lecturers. This application will speed up the attendance process, as well as increase accuracy and security in doing attendance.

METHODOLOGY

Systematically, this research method is described as in the research flow. The steps are presented as follows.

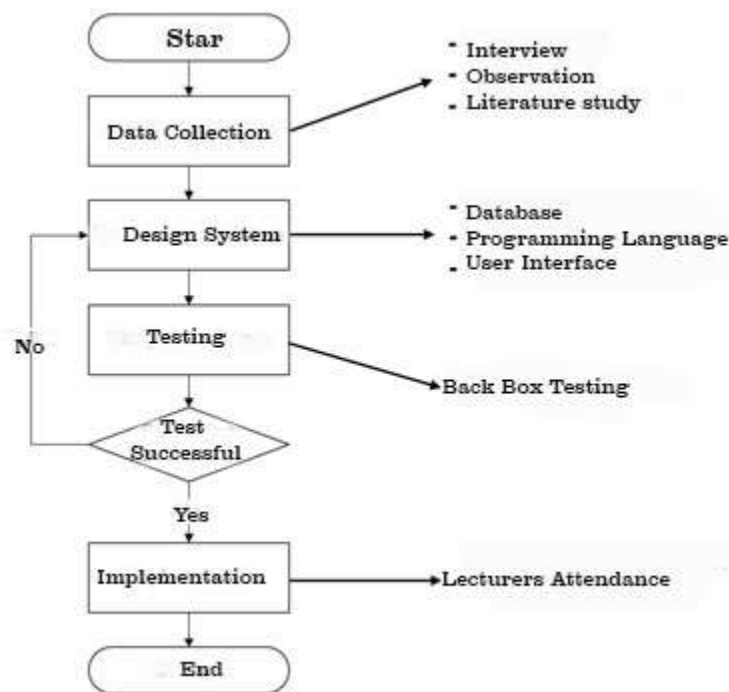


Figure 1. Research flow

Primary Data

Primary data is data collected from direct sources using data collection methods such as interviews, observations, and questionnaires ((Ulfi Sheila et al., 2021). Primary data is data obtained from direct sources, such as the results of interviews, observations, or questionnaires, collected by the researchers themselves (Hermawan et al., 2013)

Interviews are data collection techniques carried out by asking questions to respondents directly, to obtain the required information (Marliani et al., 2020). Interviews are qualitative data collection techniques carried out by talking directly to respondents and asking for answers to the questions asked (Monica et al., 2023). The interview method is used to obtain primary data in the form of responses and views from IBN lecturers and employees regarding their experiences when

taking attendance with the current system. Interviews were conducted using a structured questionnaire, which was adjusted to the objectives of the study. Through interviews, researchers obtain specific and in-depth data regarding the advantages and disadvantages of the current system. In the study "Development of the Qr code application for the presence of IBN lecturers and employees", the interview method was used to obtain information from sources who have experience and knowledge that is more relevant to the research topic. Mr. Suyono, M.T.I. is one of the sources interviewed in this study. The interview was conducted directly and face to face, the interview was conducted by asking a number of questions related to his experiences and views regarding the manual attendance process for lecturers and employees at the Bakti Nusantara Institute.(Maulida, 2020; website desa pulung kencana, 2024)

Observation is a method of collecting data by observing behavior in certain situations and then recording the observed events systematically and interpreting the observed events. Observation can be a data collection method that can be accounted for its level of validity and reliability as long as it is carried out by observers who have undergone special training, so that the results of the observation can be used as a source of accurate and reliable data so that it can be used to answer problems (Abdi, 2023; Zakky, 2020) Observation is defined as systematic observation and recording of symptoms that appear in the object of research. The recording is based on facts seen, heard and felt by the observer(Syafnidawati, 2020) .

In the study "Development of the Qr code application for the presence of lecturers and employees of IBN", the observation method was used to observe the attendance activities of lecturers and employees at IBN, especially related to the manual attendance process carried out by lecturers and employees. Through the observation method, researchers can directly observe how the manual attendance process is carried out by lecturers and employees at IBN, starting from the preparation of attendance to reporting the results of attendance. Researchers can also observe whether there are errors or obstacles in the manual attendance process carried out.

Secondary Data

Secondary data is data obtained from other sources that are already available, such as publications, financial records, or statistical data published by government agencies or other organizations (Hakim and Wibowo 2020). Secondary data is data obtained from other sources, such as documents, reports, or archives, which are used for specific research purposes(Merdeka.com, 2021; Sitoresmi, 2022)

Some secondary data sources used in this study include literature on QR code technology and its use in the work environment, documents and data related to attendance policies in the work environment, and data related to the use of QR code technology in lecturer and employee attendance. Secondary data in this study is useful for obtaining broader information on the research topic, as well as for comparing research results with other studies that have been conducted previously.(Merdeka.com, 2021; Tineges, 2021)

A literature study is a study conducted using documents as the main data source, such as manuscripts, books, newspapers, magazines, and others. Along with the development of technology, the meaning of literature does not only refer to written documents but also to digital documents (Zulkifli, 2022).What is meant by Literature Review here is the researcher's activity to collect and summarize first reviewing the development records of various theories, research results that have been carried out, and empirical experiences from experts and practitioners who have competence with the objectives of their research; both in the form of writing, voice recordings, or oral statements in various media (Firmansyah et al., 2022; Zulkifli, 2022)

In this study, the literature study method is used to obtain information and references related to the development of QR code attendance applications. Through this method, researchers can gain a better understanding of the theory related to QR codes and attendance, as well as learn the technology and application development methods that are in accordance with research needs.

Research Methods/Modeling

The system development method used in this study is the waterfall method. The waterfall method is one of the software development methods that is often used. This method is carried out with a systematic approach, starting from the system requirements stage then moving on to the analysis, design, coding, testing/verification, and maintenance stages.

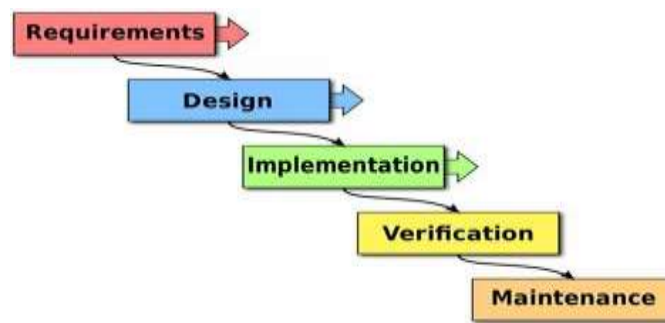


Figure 2. Waterfall

1. Requirement analysis (system requirements analysis); This stage aims to understand and identify user and organizational needs related to the application to be built. At this stage, conduct an in-depth analysis of user needs, business processes, and the environment that will affect the use of the application. At this stage, researchers collect data by means of observation, interviews and literature studies.
2. Design ; The next stage is to design the system, researchers design the system architecture and detailed design for the Qr code presence application. At this stage, select the technology that suits the system needs. The design of this system includes the selection of technology, database, system architecture, flowchart, and application display.
3. Coding (Writing program code); After understanding the system design that has been created, researchers implement the design into program codes or what is commonly called coding. At this stage, researchers use the JavaScript programming language. In writing the code, researchers use Visual Studio Code software as a text editor. After the code writing is complete, the next stage is testing the system that has been created.
4. Program Testing ; At this stage, the researcher tests the system that has been designed, testing can be done with various testing techniques, but in this study the researcher used the blackbox method. System testing aims to evaluate system performance and ensure that the designed system is in accordance with the specifications that have been set. The purpose of BlackBox testing is to ensure that the application works according to the specifications and needs of the user, and to find weaknesses or errors that may occur during use of the application.
5. Maintenance; After the IBN lecturer and employee attendance QR code application has completed the testing stage, the maintenance stage must be carried out to ensure that the application continues to function properly and can be improved as needed. Maintenance of this QR Code Application is carried out by the IT team from IBN Lampung.

Results and Discussion

Context Diagram

Context diagrams are usually used in the early stages of system analysis to understand the overall system context, identify the entities involved, and understand the interactions between the system and external entities. This diagram can also be used as an effective communication tool to clarify the understanding of the system to the stakeholders involved. In the context of the QR Code application for the presence of IBN Lecturers, the context diagram can be used to describe the interaction between the attendance system and external entities such as admins lecturers.

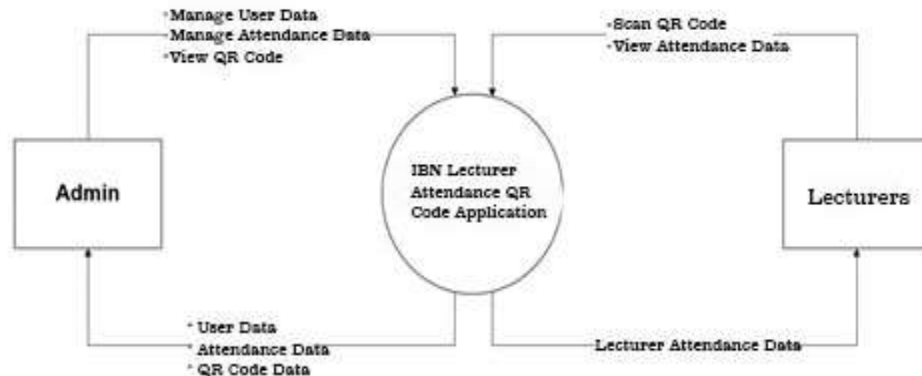


Figure 3. Context Diagram

In this context diagram, there are three main entities, namely Admin, QR Code Presence Application, and Employees. The flow of information in this context diagram can be explained as follows:

1. Admin as a user with full administrative access uses the application to manage user data and attendance and get QR codes.
2. The attendance application that provides lecturer attendance features receives instructions from the admin to manage data and store it. The attendance application also receives instructions from employees to carry out employee attendance using the QR code scan feature.
3. User employees with limited access who can do attendance in and out through the application with the QR code scan feature and get the employee's attendance data.

A. DFD Level 0

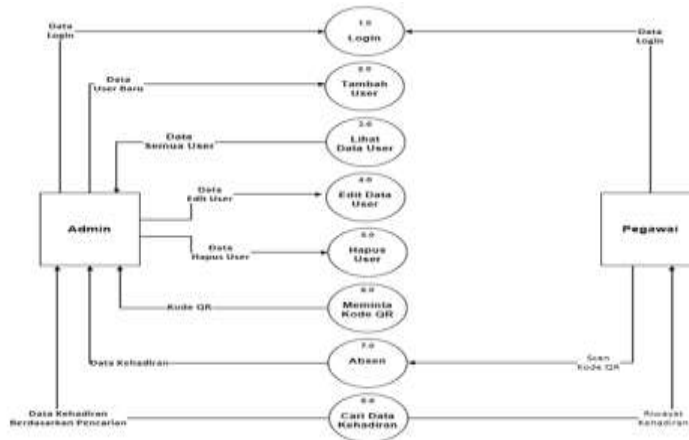


Figure 4. DFD level 0

The DFD Level 0 above provides a contextual overview of the data flow between external entities, and some processes that exist in the system. This helps understand how Admin and Employees interact with the system in performing various attendance-related activities.

In the DFD Level 0 above, the external entity "Admin" interacts with the system through "Admin Activities", which include logging in, adding new users, viewing user data, deleting users, editing user data, viewing attendance data, and accessing QR codes. User data and attendance data are data storage used in the system.

The external entity "Employee" interacts with the system through "Employee Activities", which involves logging in, checking in by scanning a QR code, and getting attendance data. Attendance data is also the data storage used in the system.

B. Flochart Absen QR

Flowchart attendance with QR Code scan is used to describe the logical flow of the attendance process using QR Code technology in the IBN Employee QR Code attendance application. This process is a Lecturer or Employee who wants to do attendance by scanning the QR Code that has been provided at the attendance location.

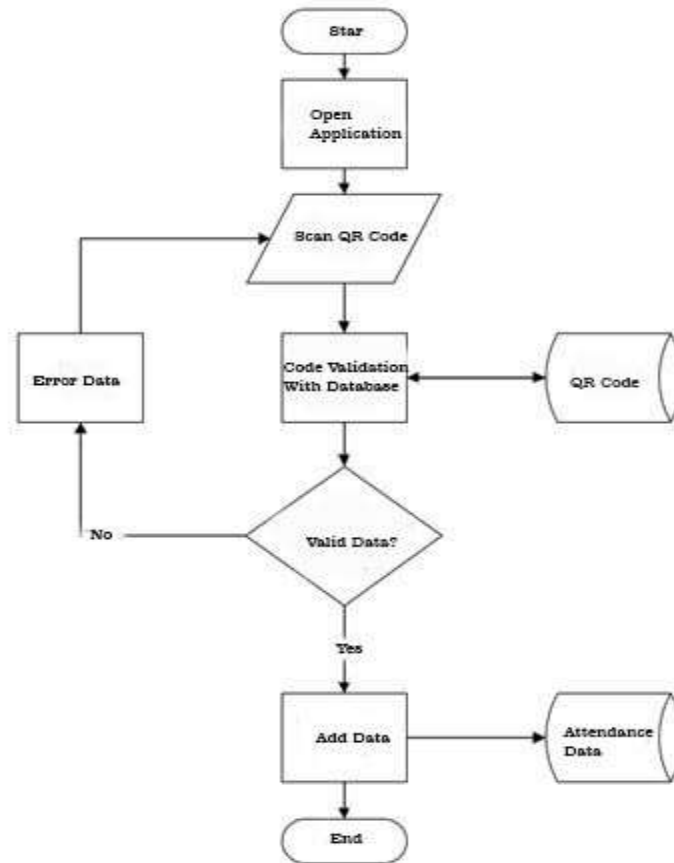


Figure 5. Flowchart

Here is an explanation of the attendance flowchart by scanning the QR Code:

1. Start: The flowchart begins with the "Start" symbol which indicates the beginning of the attendance process by scanning the QR Code.
2. Opening the Attendance Feature: The user or employee opens the application or feature specifically used to perform attendance.
3. Scanning the QR Code: The user or employee uses the cellphone camera to scan the QR Code available at the attendance location.
4. Validating the QR Code: The system will validate the scanned QR Code to ensure the authenticity of the QR Code. This includes checking into the database.
5. Attendance Successful: If the QR Code is valid, the system will record the user or employee's attendance by recording the attendance time and other related information. The user will receive a confirmation or success message indicating that the attendance was successful.
6. Attendance Failed: If the QR Code is invalid or there is another error in the attendance process, the user will receive an error message or notification indicating that the attendance failed. The user can then be asked to repeat the attendance process or contact the authorities for assistance.
7. Finished: The flowchart will end with the "Finished" symbol which indicates the end of the attendance process by scanning the QR Code.

C. Absence Code Page (Admin)

The attendance code page is a page that will be displayed when the admin successfully logs in to the application. This page displays the QR Code for clocking in and out. The code

will be scanned by employees when clocking in and out. The following is an implementation image of the attendance code page:

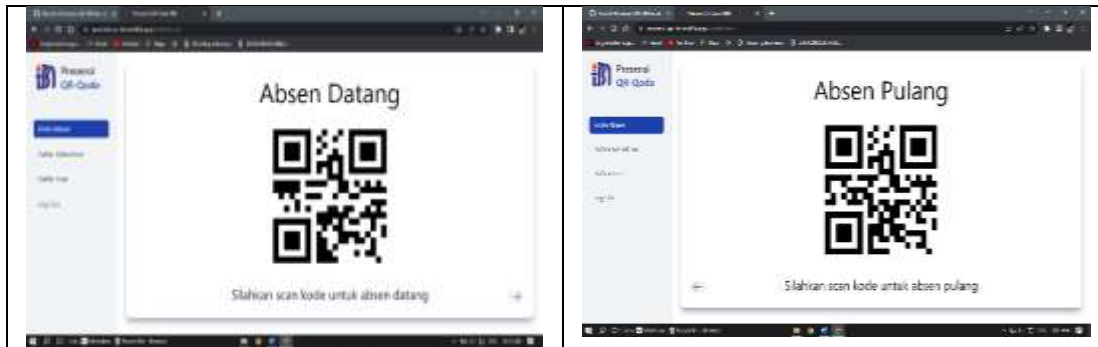


Figure 6. Desktop Attendance Code Page Coming and Going

D. Login Testing

Testing on the login feature aims to test the system's ability to check users who are already registered and can access the application. The following is a table of the results of testing the QR Code application for the presence of IBN Lecturers on the login feature.

Table 1. Login Testing

| No | Activity | Response System | Result |
|----|---|--|--------|
| 1. | Empty NIP and Password | The system will reject entry and give an error message. | Valid |
| 2. | Only fill in NIP and leave Password blank | The system will reject entry and give an error message. | Valid |
| 3. | Only fill in Password and leave NIP blank | The system will reject entry and give an error message. | Valid |
| 4. | Fill in the wrong NIP and Password. | The system will reject entry and give an error message. | Valid |
| 5. | Fill in NIP and Password correctly. | The system accepts login access and directs the user to the page according to the user's role. | Valid |

CONCLUSION

This study aims to analyze and design an innovative attendance tracking system using a QR Code application for lecturer attendance IBN by developing this QR code presence application. The waterfall development method uses stages, such as needs analysis, system design, code writing, testing, and the JavaScript programming language and database. This application automatically scans QR codes to meet the needs of IBN Lecturer attendance.

Based on this study, some suggestions that can be given are:

1. The QR Code Presence application can be improved by developing additional features, such as automatic notifications to managers regarding attendance and lateness data, and integration with other Lecturer and Employee data management systems.
2. Improve the User Interface to make it easy to use and attractive to users. This can include the selection of colors, the layout of each component, and the use of appropriate icons or images.
3. Conducting further testing in addition to functional testing, further testing needs to be done, such as load testing, to test the application's ability to handle high user loads.

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