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WEBSITE BASED PARKING MANAGEMENT INFORMATION SYSTEM CASE STUDY OF THE DARMAJAYA INSTITUTE OF INFORMATICS AND BUSINESS

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Abstract
This research aims to design and implement a website-based Parking Management Information System as a case study at the Darmajaya Institute of Informatics and Business. The system developed is able to select parking spaces according to the parking quota provided by the campus. The parking locations provided consist of Canteen Parking Lots, Basketball Court Parking Lots, Futsal Court Parking Lots, Parking Lots in Front of the Mosque, Parking Lots Next to the Basketball Court, and Parking Lots Next to the Futsal Court. In this system, when a vehicle enters, an admin will enter data on the plate number, entry date, parking code, entry time, vehicle type and parking position specified for the vehicle owner. This system helps security guards as parking managers at the Darmajaya Institute of Informatics and Business to carry out parking management well and efficiently, so that the problem of parking overload can be minimized. The results of this research contribute to the development of information technology in parking management in the campus environment. By using this system the parking management process can be more structured and computerized, as well as providing convenience for parking users and parking managers and can increase efficiency and improve services in overcoming parking problems that often occur on campus.

I. INTRODUCTION

Darmajaya Institute of Informatics and Business (IIB Darmajaya) is one of the most popular universities in the Lampung region. Along with the growth of the student population and other users on this campus, the number of private vehicles, especially two-wheeled vehicles such as motorbikes, has also increased. As a result, parking problems on campus are becoming increasingly complex. Irregular, poorly controlled and inefficient parking conditions can cause traffic jams, disrupt vehicle safety and create inconvenience for parking users. The poor parking situation at IIB Darmajaya is a challenge for campus management in optimizing parking services and improving user experience. With six parking areas provided, namely the Mosque, DJ Shop, Student Affairs, Futsal Field, Pier, and DSC, the presence of vehicles that exceed the capacity of the parking area causes parking congestion in several areas. A parking system that still uses manual methods without a structured system to regulate the number of vehicles in each parking lot also causes uncertainty about the availability of parking spaces for users.

This research aims to design and implement a website-based Parking Management Information System as a solution to parking problems at IIB Darmajaya. By implementing a structured and

integrated system with information technology, it is hoped that existing parking problems can be resolved efficiently. This system was built to provide better parking management, provide real-time information about parking space availability, and improve the parking experience for users. With this solution, it is hoped that the parking process on campus will become more orderly, smooth and safe. In addition, it is hoped that the results of this research can contribute to the development of information technology in parking management and provide valuable input for the development of more effective parking systems in educational institutions and other environments, especially for the Darmajaya Institute of Informatics and Business.

In previous research, in 2022, a parking system was developed using the extreme programming method, where the results of this research were that the parking system could carry out good parking lot management at Sultan Syarif State Islamic University [1]. Apart from that, in 2023 a parking management system specifically for commercial parking will be built, where this system has payment and parking reservation features [2]. In the same year at Andalas University, research was carried out on a parking management system to control the parking density experienced by the university [3]. Furthermore, in 2023, a parking levy system will be implemented for the city of Sidoarjo, where the government can control parking along with collecting levies on regional parking [4]. Research on parking management also continues to be explored, one of which is using the Rapid Application Development (RAD) method [5]. In previous research, research was carried out using extreme programming methods, RAD, special parking systems for commercial parking, controlling parking density at universities, and parking levy systems at the city level. Meanwhile, this research uses a different approach, namely by developing a website-based Parking Management Information System within the Darmajaya Institute of Informatics and Business campus. The main goal of my research is to improve the efficiency and effectiveness of parking management and provide a better parking experience for campus users. By focusing on a specific campus environment, this research will provide solutions that suit the needs and unique characteristics of the IIB Darmajaya campus environment.

II. LITERATURE

2.1. Theory of Information System

(Lesmana & Silalahi, 2020), an information system is a combination of various information technology components that work together and produce information in order to obtain a single line of communication within an organization or group. According to (Maydianto & Ridho, 2021) an information system is a number of components where the components are interconnected with each other in order to achieve an expected goal.

Another definition of information system according to (Alda, 2023) information system is a relationship between data and procedures that utilize hardware and software to transmit useful information. According to (Yanuardi & Permana, 2019) an information system is a system that can be defined as collecting, processing, storing, analyzing and disseminating information for certain purposes. Like other systems, an information system consists of input (data, instructions) and output (reports, calculations). According to (Heriyanto, 2018) an information system is a collection of subsystems that are interconnected, gathered together and form a single unit, integrating with each other and collaborating between one part and another in certain ways to carry out data processing functions, receiving input in the form of data. -data, then process it (processing) and produce output in the form of information as a basis for making decisions that are useful and have real value that can be felt as a result both at that time and in the future, supporting the operational, managerial and strategic activities of the organization, and utilize various existing resources available to the function to achieve objectives. According to the expert opinion above, it can be concluded that an information system is a collection of several components that manage data so that the processed data can be used as meaningful information and can help achieve organizational goals.

Parking is a non-temporary state of not moving a vehicle. Included in the definition of parking is every vehicle that stops in certain places, whether stated by signs or not, and not solely to raise and/or drop off goods and/or people. Parking is a necessity for vehicle owners and they want their vehicle to be parked somewhere. Where this place is easy to reach. One of the desired conveniences is on-street parking. For this reason, parking patterns on the road are parallel and corner parking patterns. However, parking on the road is not always permitted, because traffic flow conditions do not allow it (Oktaviani et al., 2019). Parking managers want to provide convenience for parking users so that users can park their vehicles in existing parking spaces comfortably (Azmi, 2022).

2.2. The theoretical system used

To support the development in this research, the SDLC (System Development Life Cycle) method will be used as an approach to developing a website-based parking system. SDLC is a systematic approach that involves the stages of planning, analysis, design, implementation and testing to produce a structured and high-quality system [6]. SDLC has several

advantages that make it a popular approach in developing information systems or software [7].

a. SDLC Provides a structured approach to system development, ensuring well-organized stages.
b. SDLC Helps identify and manage risks effectively during system development.
c. SDLC has careful testing at every stage thereby improving the quality of the system or software.
d. SDLC enables better and timely planning of project schedules.
e. SDLC Can be adapted to various project sizes and complexities.

Furthermore, for system development, this research uses the Hypertext Preprocessor (PHP) programming language as the main language for building system functionality. Apart from that, Ajax, JavaScript, HTML and CSS technology are also used to create an interactive and responsive user interface. The integration of these technologies allows the website-based parking system to be built to be more dynamic, efficient and easily accessible to users [8]. In this way, parking users at the Darmajaya Institute of Informatics and Business will get a better and more up-to-date parking experience through the implementation of these technologies in the designed information system.

The use of PHP in this research is because PHP is an open-source programming language that is widely used for web development [9]. Its main advantages include ease of use, integration with databases, extensive library support, and good scalability [10]. Apart from that, PHP is often used to build various types of web applications such as e-commerce sites, CMS, forums, and others [11]. Therefore, in this research we try to use PHP to develop a parking management system.

For system analysis, this research uses the Unified Modeling Language (UML), a standard language used to model and describe system designs visually. UML provides notation and techniques to describe the structure, function and interactions between components in a system [12]. By using UML, this research can carry out an in-depth analysis of the proposed website-based parking management information system. The UML model will help in visualizing system workflows, relationships between components, as well as various possible use cases [13]. UML also helps in identifying and overcoming potential problems and challenges in system design before implementation [14]. By utilizing UML, this research can produce a system design that is more structured, well documented, and can be understood by the entire development team and related parties.

III. RESEARCH METHODS

The research method that is different in this research is the use of the SDLC (System Development Life Cycle) approach in developing a website-based Parking Management Information System on the campus of the Darmajaya Institute of Informatics and Business. This SDLC approach ensures that the entire system development process is structured and well documented. In previous research on parking systems, various different development methods have been used, such as extreme programming and RAD approaches. So this research uses SDLC. SDLC emphasizes the stages of needs analysis, design, implementation, testing and maintenance sequentially, thus ensuring that the entire system development process is carried out in structured and planned stages [15]. The advantage of using SDLC is its ability to better manage risk, ensure controlled system development, and ensure the entire development process is carried out according to predetermined plans and schedules. In addition, the SDLC approach also focuses on complete documentation, making it easier to maintain and further develop in the future [16]. The SDLC stages in developing this system are as follows: [17]

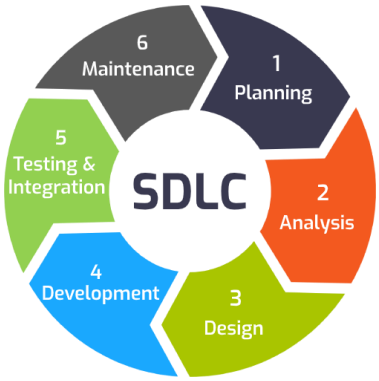

Figure 1. SDLC Development Stages

1. Needs Analysis: The first stage in SDLC is identifying the needs and requirements of the parking system to be developed. The development team will conduct interviews with related parties, such as parking managers, security guards and parking users to understand existing problems and needs. This analysis will help formulate the features and functionality that must be present in the parking system.
2. System Design: Once the system requirements are identified, the next stage is to design the system as a whole. The design will include the system architecture, user interface, and proposed parking assignment algorithm. In addition, this stage will explain how the system will interact with users and the database, as well as how data will be stored and managed.
3. Implementation: After the system design is complete, the development team will begin implementation. The program code will be written based on the design that has been created previously. PHP, HTML, JavaScript and CSS programming languages will be used to develop

the main components of a website-based parking system.

4. Testing: Once the implementation is complete, the next stage is system testing. Testing will be carried out to ensure that the system runs according to previously established requirements and functions properly. Testing will include functionality, security, performance and other quality tests.
5. Use and Evaluation: Once the website-based parking system is ready, the system will be tested and evaluated by parking managers and parking users on campus. User input and feedback will be used to make further improvements and improvements if necessary.
6. Maintenance: Once the system is fully operational, a maintenance phase will be carried out to ensure that the system continues to run well and continues to be updated according to developing needs. Maintenance will involve bug fixes, performance improvements, and functionality updates as requirements or current technologies change.

Through the use of the SDLC approach, it is hoped that this research can contribute to the development of more structured and controlled information technology for parking management in campus environments. Thus, this research method is a significant differentiator from previous studies.

IV. RESULTS

The results of this research explain the results and implementation of the program from various stages that were previously designed. Some of the things that are focused on here are the functions that users have. Both users are required to have an internet connection to access this service. The following are the results of the research that has been carried out:

4.1. Login Page

The login page is the main page that appears when the admin wants to access all the features available on the website. Admin must enter a valid username and password to be able to enter the system. After successful login, the admin will be directed to the dashboard page which provides full access to various features and functions needed to manage the parking management information system.

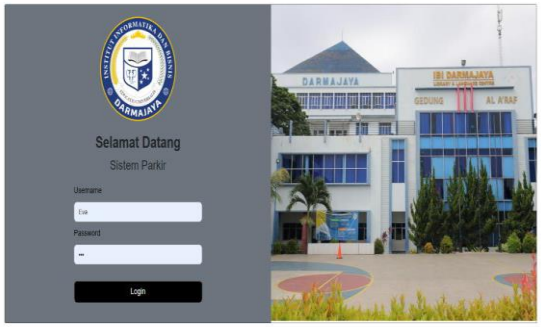

Figure 2. Login Page

4.2. Entrance Parking Page

The parking entrance page is the initial page that provides a form that allows users to fill in vehicle data before entering the parking area. This form contains various necessary information, including the selected parking area, vehicle type (such as two-wheeled or four-wheeled), vehicle plate number, and vehicle brand. Users must fill out this form correctly and completely before submitting data to obtain a parking permit.

This form serves to provide important information about vehicles that will enter the parking area. The selected parking area will be used to determine the appropriate parking location for the type of vehicle. In addition, vehicle plate number and brand data will be recorded for parking management and supervision purposes. By filling in this form, users can easily enter the parking area with valid permission, thereby reducing the risk of traffic jams or irregular parking problems.

This also helps parking managers in monitoring and managing parking lots more efficiently and accurately. Apart from that, the data recorded in this form can also be used to produce parking activity reports which are useful for evaluation and future planning.

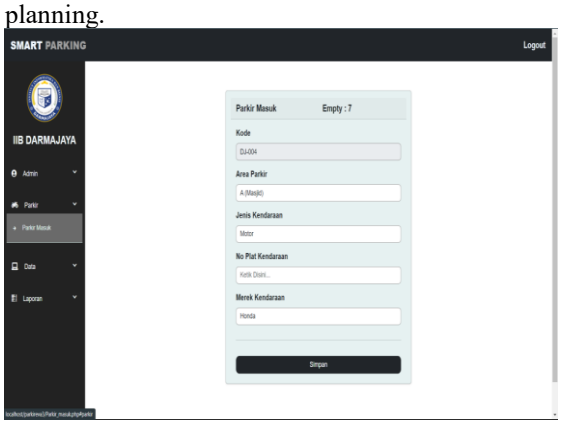

Figure 3. Entrance Parking Page

4.3. Parking Ticket Print Page

The ticket print page is a page provided to print parking data that has been previously input. This page provides various features that allow users to customize print settings according to their needs. Some of the features contained in the ticket printing page include:

With a ticket printing page equipped with these features, users can easily organize and print parking data according to their needs. These features also help increase flexibility and convenience in the process of printing parking data, making it easier for users and increasing the efficiency of parking management on the campus of the Darmajaya Institute of Informatics and Business. The printed ticket page will later be printed using a thermal printer, which can print tickets in a size of 80x48 mm, making it easy for parking customers to store them.

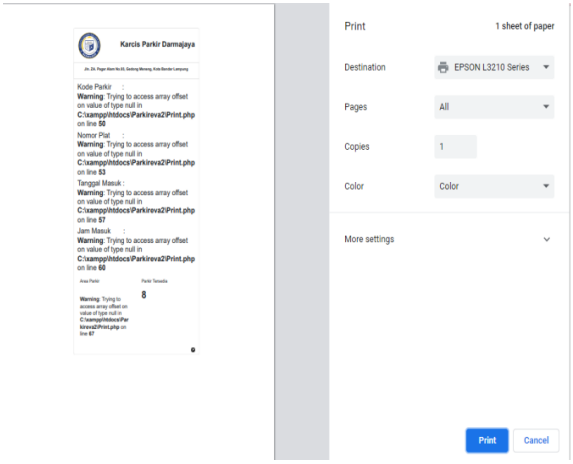

Figure 4. Parking Ticket Print Page

4.4. Parking Data Page

This page is a display that displays parking data from vehicles that have entered the parking area. The data displayed includes various important information such as vehicle plate number, date and time of vehicle entry, vehicle type, and designated parking location. On this page, parking data will be presented in a structured and easy to read display. Users can easily see and search for information about vehicles that have entered, making it easier to monitor and manage parking lots. A search feature is also provided to make it easier for users to find parking data based on certain criteria, such as vehicle plate number or entry date.

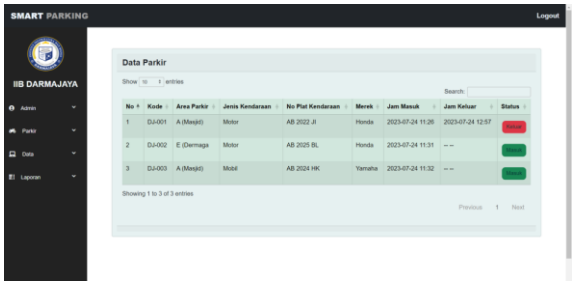

Figure 5. Parking Data Page

4.5. Reports Page

This page provides a form that allows users to enter specific dates to print parking activity reports. The form contains start date and end date columns which can be filled in by the user according to the desired time range for the report. By using this form, users can easily determine the time period that will be covered in the parking report, so that the resulting report is more focused and relevant. This form feature helps users access the desired parking information based on vehicle entry and exit dates.

Once the user fills out the form correctly and selects the desired report option, a parking report can be generated easily by pressing the print button. The resulting report will contain important information about parking activity within the specified time period, such as the number of vehicles entering, average parking time, and other relevant information.

With this page and the form provided, users can quickly and efficiently access parking reports needed for analysis and decision making regarding parking management in the campus environment. This helps improve more effective monitoring and management of parking and can provide valuable information for future policy making.

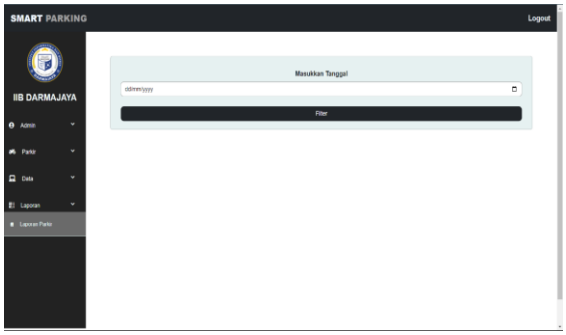

Figure 6. Parking Report Print Page

V. CONCLUSION

The results of this research show that the parking management system developed has superior features in the form of vehicle status and vehicle position which differentiate it from other parking management systems. The vehicle status feature allows parking managers and security guards to easily see whether a vehicle has left the parking area or is still in the parking area. This is very useful for avoiding errors in parking management, such as vehicles not being recorded when leaving or being forgotten in the system. Apart from that, the vehicle position feature is also an advantage of this system. This feature allows parking users to know the exact position where their vehicle should be parked. Users will be given information about parking locations that suit their vehicle type, so they can easily find available parking spaces and avoid traffic jams or confusion in looking for empty parking spaces.

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