DEVELOPMENT OF WEB-BASED HEALTH INFORMATION SERVICE SYSTEMS

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ABSTRACT

Background: Efforts to build services that can provide information quickly and accurately are significant for an agency. The use of the internet in finding health services is a place that can provide information that is not only fast but also provides the right solution. Therefore, a health service website was created containing information about health services, by utilizing the development of information technology, which can carry out health services through a website that can be accessed at any time (Real Time) by the public anywhere and anytime. Laravel is a Hypertext Preprocessor (PHP) programming language framework created by Taylor Otwell that has many modern features that help developers create applications. This study aims to design a technology-based health information service system with a web platform to increase public health awareness and facilitate access to information about health services.
Method: The method used is a linear system development method, namely the waterfall method where each stage of development is carried out sequentially, starting from the stages of analysis, design, implementation, testing, and maintenance.
Result: The results showed that web-based health information service systems can improve the efficiency and effectiveness of health services, obtain accurate and up-to-date information about health services, and provide easy access to health information for the public.
Conclusion: Based on the results of research that has been conducted, it can be concluded that the development of web-based health information service systems has the potential to improve the quality of health services. This system can help health facilities improve the efficiency and effectiveness of health services, by reducing manual processes and improving collaboration between health workers, increasing the accuracy and completeness of health data, reducing data input errors and increasing data accessibility, increasing the security and confidentiality of health data, and increasing patient satisfaction specifically and the public in general, by providing faster services and easy.

Keywords: Health information services; technology; health awareness

INTRODUCTION

Research into the development of web-based health information service systems is important and urgent, because it has the potential to improve the quality of health services, and can provide easy access to health information and services, especially for individuals in areas with limited mobility. This can help to ensure that everyone has access to the care they need. Therefore, the need for a web-based health information system that is easily accessible, efficient, and secure has become an increasingly real need. This information service system has emerged as a promising solution, offering a centralized platform for managing and disseminating healthcare-related data, enabling healthcare providers to make informed decisions, improving patient engagement, and improving overall healthcare services.

This information service system provides many benefits, including improved delivery of healthcare information to the public, increased patient/community involvement, simplified administrative processes, data-driven decision-making, and increased accessibility: where this information service system provides easy access to health information and services, especially for individuals even in areas with limited mobility. Despite facing several challenges,

this information service system has tremendous potential to revolutionize the healthcare industry, enabling the provision of high-quality, patient-centered, and accessible care.

Public service is an obligation of each agency including health services. Health services that use computerized systems only focus on certain parts. The availability of information systems causes each individual or group to be able to get health services quickly and can increase knowledge and provide information about health problems that occur in the surrounding environment (Susanto et al., 2016). Efforts to build services that are able to provide information quickly and accurately are very important for an organization (Pangestu et al., 2021)

Regarding the current Covid19 pandemic, even though there are no restrictions on activities outside the home or doing other activities, people have begun to get used to using internet media in dealing with problems including health service information. The Covid pandemic has had a positive impact on the development of the digital era in all fields. People who previously did not understand the use of the internet inevitably had to learn and eventually became "addicted" to the use of information technology, one of which was in health services. (Fathoni et al., 2016)

The information about hospital and clinic services in Jambi Province is still difficult to obtain. There is no integrated platform regarding doctor practice schedules, room availability at hospitals and health centers. People have to search for contact numbers one by one through several applications which takes a long time. Especially for those outside the province of Jambi, upon arrival at the hospital the room is full, the doctor's practice schedule is over or is not practicing so this causes ineffective use of energy, time, costs and can even have fatal consequences for patients.

The use of the internet in finding health services certainly requires a forum that can provide information that is not only fast but also provides the right solution, because by getting inaccurate information instead of overcoming health problems but can have a fatal impact on the patient. Therefore, a health service website was created that contains information about the doctor's practice schedule, room availability at hospitals, and clinics in Jambi Province. By utilizing the development of information technology, which can perform health services itself through a website that can be accessed at any time (Real Time) by the public anywhere and anytime. Real time, also known as real time, is an operation of software and hardware systems that are limited by deadlines when operations occur. (Fathoni et al., 2016)

According to the Indonesian Ministry of Health, health services are individual and group activities in the prevention, improvement, maintenance, and healing process of disease, helping to restore the health of both individuals and groups, families and society in general. (Sulila Iswanto , Agus Lahinta, 2020). All citizens have the right to invest in proper health to ensure the implementation of health services, a system is needed. (Pangestu et al., 2021) Based on these conditions, of course, it can be used as a basis for providing a health service information system that can make it easier for people to get information about health services quickly anywhere and anytime in the form of doctor practice schedules, availability of facilities at hospitals, clinics and health centers in Jambi City. So this research aims to design an information system that is integrated with several hospitals, health centers, clinics in the city of Jambi, as well as web-based health services with the Laravel framework.

Laravel is a Hypertext Preprocessor (PHP) programming language framework created by Taylor Otwell and first released on June 9, 2011. Laravel has many modern features that really help developers in creating applications. Some of these features include Bundles, Eloquent ORM (Object-Relational Mapping), Query Builder, Resource

Controller, Blade, Migration, Middleware, and Automatic Pagination. Laravel also has several advantages, namely using the Artisan Command Line Interface (CLI), using the PHP Composer package manager, writing shorter, easier to understand, and expressive program code. (Tristiyanto & Adelliani, 2021).

Therefore a web-based and mobile-based information system design is needed to complement these shortcomings. By using the Laravel Framework and Android Programming as well as a collaborative filter algorithm, a web-based application and an Android phone are generated to address the problem. Sharing information and discussions between the public and related agencies is easier to use this system.

METHOD

The development method used in this research is the Waterfall method. The stages performed in the Waterfall method are shown in Figure 1.
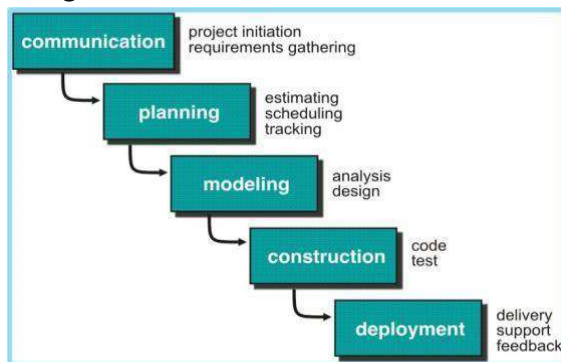

Figure 1. Waterfall method

1. **Communication**
   The communication stage is carried out by studying the literature and conducting interviews with several patient families regarding what obstacles are faced in finding updated health services, for example finding a doctor's practice schedule, room availability so that patients and patient families can easily get the information needed quickly and accurately.

2. **Planning**
   After obtaining information, the next stage is planning which is done by collecting what information data is needed in system development. This stage explains the estimated technical tasks to be performed, the risks that can occur, and the resources needed in system development.

3. **Modelling**
   The modeling stage contains system architecture modeling which is still being carried out in the form of a design as a system overview material including use case diagrams, activity diagrams, and class diagrams that will be made so that it makes it easier for users to understand the process flow of the system to be created. The current health services available are still in the form of separate health service information. (Fathoni et al., 2016).

4. **Construction**
   The construction stage is carried out by translating the design form into code or machine-readable form or language based on the previously created design. System development uses the PHP programming language which means that the commands given will be fully executed on the server. The framework used is Laravel by using the PHP language to build web-based applications in a more structured way. The database used is MySql, MySql is a SQL database management system software (database management system) or DBMS that is multithreaded and multi-user.

5. **Deployment**
   The Deployment stage is a testing stage carried out using black box testing, to help test systems that pay attention to errors in detail. Testing focuses on the functional specifications of the software. Testers can define a set of input conditions and test the functional specifications of the program.

RESULTS AND DISCUSSION

Previous research entitled Design and Implementation of Web-Based Publlic Health Center Application Using Laravel Framework by Prakas Haryo Pangestu et al, helped in providing health services such as providing online health examination services, giving examination queue numbers, and data collection or archiving easier health service data. The next research is entitled Inpatient Health Service Information System with Laravel as a Framework by Tristiyanto and Adelliani which discusses inpatient services including, registration of inpatients, making patient reports, managing patient data, and availability of inpatient rooms.

The third study on the design of a real-time registration queue application for laravel web-based Regional Public Hospital caruban health services by Dwi Febriana Susilowati discusses providing information to users about the online queuing system in real time and the access system can be done at home. Whereas this research focuses on a web-based health service information system that provides information about the latest and accurate health, it also provides a cool chat facility, when patients want to ask something will be answered by the admin online anytime and anywhere. This information system will also provide information about hospital telephone numbers and doctor practice schedules at hospitals in the city of Jambi so that this information system will make it easier for patients to find information about health services. People always expect services that are fast and responsive and easily accessible by health agencies (Alkaff, 2021).

1. **Context Analysis of the Proposed System**
a. Requirement System
   Here are some user needs, in this case the needs of the community are presented:
   1) The system built must be able to provide information to the public in the context of health service information in Jambi province.
   2) The management of this information system includes health centers, clinics and hospitals and other health services.
   3) The system that is built is able to display reports in real time, accessible anytime and anywhere by the community.
   4) All data is stored centrally in the database.
b. Proposed System Concept (Statement of Purpose)
   This Health Information Service System is a website-based information system that was built to meet the needs of the community in accessing information quickly using an internet browser in the context of searching for information on health centers, clinics, hospitals and other health services.
c. Specifications of the proposed system
   In order to better describe the website information system in detail, the following are the specifications of the proposed system:
   1) Admin The following is a list of activities that can be carried out by the Admin:
      a) Login
      b) User Management (data management of health centers, clinics, hospitals, other health services and locations)
      c) Logout
   2) User/Community User The following is a list of activities that can be performed by user/community users:
      a) Login, user/community user
      b) Accessing the health information service system
      c) Manage identity profile
      d) Logout

2. **System Architecture Design**
   System architecture design is carried out to show the performance of the web system being built. The system architecture design is divided into 3 parts, namely the design of the server application interaction architecture, application architecture design and software

architecture design. Server application interaction architecture describes the interaction of server component components, namely webserver, database server and server applications. The interaction of the Website Information System server application is described as follows:

a. User
b. Mysql Database Server
c. Webserver: Apache
d. Application Server: PHP
e. PHP Web Access Input data and response from Application Server Process Data Response Query Data Results
f. Web Response

System architecture design consist of:

a. Application Architecture Design

The application architecture shows several information modules and functions that exist in the Web-Based Health Information Service System, the following application architecture design:
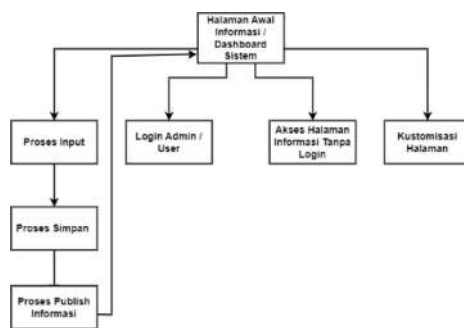

Figure 2. The application architecture

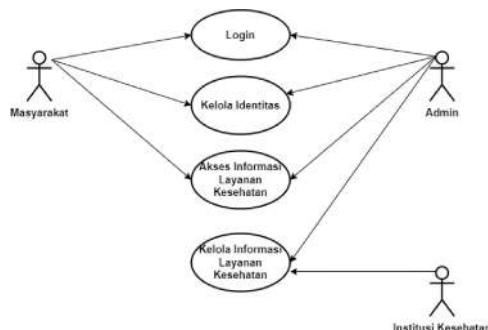b. Software Architecture Design

Figure 3. Overall Use Case of Information Service System

From the picture above, it can be explained that the relationship between the community and the system as well as the admin with the system and the health agency with the system is an identification of the description of the use case of the entire web-based health information service system.

c. Activity Diagram Design

This stage identifies actors by graphically modeling the business process or steps of each activity carried out by the system.
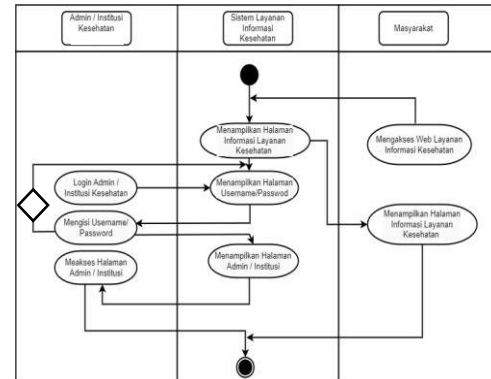
Figure 4. System-wide Activity Diagram

d. Class Diagram Design

After modeling the activity diagram, the next stage is designing / modeling the class diagram. This diagram shows the relationship between classes in the system being built and how they collaborate with each other to achieve goals. The purpose of making a class diagram is to describe the static design of the system being built. The following is a class diagram modeling of the Web-Based Health Information Service System

Actor Identification

a. Primary Business Actor (PBA)

From the research conducted on the web-based health information service system, the community is included in the Primary Business Actor because the community benefits from access to information.

b. Primary System Actor (PSA)

From the research conducted on the web-based health information service system included in the Primary System Actor type is the system manager admin.

c. External Receiving Actor (ESA)

From the research conducted on this web-based health information service system which is included in this type of External Receiving Actor is a health agency such as public health centered,

Hospitals, Clinics and other health services that can feel the output of this information system.

Table 1. Actor Identification

No	Type Actor	Actor	Activity Actor	Benefit
1	PBA	Community	Accessing web-based health information service system	Knowing health service information such as doctor practices, the number of rooms available at hospitals/clinics, and other health service information.
2	PSA	Admin Manager	Manage System, Input, Edit, Delete Information	Accessing the website, and updating health service information from various sources
3	ERA	Karumkit, Head of Clinic, Health Center Heads, and Doctors	Manage/update Health Service Information	Access the website, and update the health service information they have such as available rooms, doctors and other services.

3. Product Definition

Defining the product is the initial stage in project planning. As previously explained, the product to be created is a Web-based Health Information Service System that is able to facilitate the public in accessing information about health services at various health institutions.

4. Activity Definition

At this stage, it will be explained about the activity plan that will be carried out at the next stage, as for the description of the activity plan that will be carried out is as follows:

Table 2. Activity Definition

No	Activity Name	Input	Output
1	Context Analysis Stage Check	Content analysis document	Requirment System document, proposed System document
2	Stage Check System Architecture Design	System architecture design document	Server application interaction architecture, Application architecture, Software architecture
3	Stage Check Process Modeling	Process Modeling Document	System modeling with UML
4	Design of information structure	Requirement system, current system analysis document, proposed system model document.	Page definition, Information structure
5	Interface Design	Requirement system, Current system analysis document, proposed system model document, application information structure to be created.	Interface design
6	Prototyping		Prototype of the system created
7	Testing/ evaluate		Test result information

5. Resource Estimation

The following is a summary of the resources required at each stage of the project:

a. Content analysis checker
The resources needed at the stage of re-examining the context analysis stage are all documents at the context analysis stage.

b. System architecture design checker
The resources needed at the system architecture design stage are all documents at this stage, namely the server application interaction architecture, application architecture and software architecture.

1) Information structure design.

The resources needed at the information structure design stage include:

a) System requirement document.
b) System analysis document.
c) Proposed system concept document.
d) Documents at the System architecture design and process modeling stages.

Interface Design The resources needed at the information structure design stage include:

a) System requirement documents.
b) Current system analysis document.
c) Proposed system concept document.
d) Documents at the System architecture design stage and Process modeling stage.

2) Website Development Information Structure Design

At this stage, the details of the needs will be represented in the form of a list of website pages and details of further design activities. The following is a detailed list of pages that will be created:

a) Home Index Page
b) Profile Page
c) Hospital Information Page.
d) Health Center Information Page.
e) Doctor Information Page
f) Clinic and other health center information page
g) News Page
h) User Login Page
i) Health Center, Hospital, Clinic and Yankes Input Page.
j) Edit Health Center, Hospital, Clinic and Yankes page.
k) Delete Puskesmas, Hospital, Clinic and Yankes page.
l) Logout page.

After defining the pages that will be created, the next step is to structure the pages that have been defined previously. The following is the page structure design of the Web-Based Health Information Service System (Figure 5).

3) Interface Design

After the information structure design process, the next step is to design the interface. The following is the interface design of the Web-Based Health Information Service System: Index Home Page (Figure 6). The display in Figure 6 is a page to display service information on hospitals, health centers, doctors, clinics and other health service info available specifically in Jambi Province.

Figure 5. Health Information Service System Page Structure

Figure 7. Implementation of Hospital Page Interface Design

The display in Figure 7 is a page to display hospital service information such as information on the availability of hospital rooms and other services owned by each hospital and is updated information from the hospital.

Figure 8. Implementation of the Doctor Page Interface Design

The display in Figure 8 is a page to display doctor service information such as information on the availability of pediatrician services, general specialist doctors available at hospitals, health centers and clinics.

Table 3. System Testing

Activity	Applied result	Output	Description
Login Admin			
Admin Access Menu Login	Login On Page Login Form	Display Form Page Login	Valid
Activity	Applied result	Output	Description
Tambah Data Informasi Layanan			
Admin/Institution Click Button Add Data	Enter the Add Data Form Page	Display Form Page Add Data	Valid
Activity	Applied result	Output	Description
Edit Data Informasi Layanan			
Admin/Institution Click Button Edit Data	Enter the Data Edit Form Page	Edit Form Page Data	Valid
Activity	Applied result	Output	Description
Delete Data Informasi Layanan			
Admin/Institution Click Button Delete Data	Enter the Data Form Page	Deleting Data on Data Form Page	Valid
Activity	Applied result	Output	Description
Lihat Layanan Informasi Kesehatan			
User Clicks View Menu Hospital Data	Enter the Information Menu on the Availability of Hospitalization and Services	Display Information Data on Availability of Treatment Rooms and Services	Valid
User Clicks View Menu Health Center Data	Enter the Information Menu on the Availability of Hospitalization and Services	Display Information Data on Availability of Treatment Rooms and Health Center Services	Valid
User Clicks View Menu Doctor Data	Enter the Doctor Service Availability Information Menu	Display Doctor Availability Information Data	Valid
User Clicks View Menu Clinic Data	Enter the Clinic Service Availability Information Menu	Display Clinic Service Availability Information Data	Valid
User Clicks View Menu News Data	Enter the Important and Latest Health News Information Menu	Display Important and Latest Health News Information Data	Valid

News Page Interface Design Implementation. The display in Figure 9 is a page to display information about the latest and important health news.

Figure 9. Implementation of the News Page Interface Design

6. System Testing

At this testing stage by testing the functions in the program, using the functional testing black box After the design stage is complete, the next stage is testing the system being built. In accordance with the scope of the problem, system testing uses the black-box method, and is limited only to testing the interface design not yet at the Application software development testing stage.

CONCLUSION

Health services need to be improved to help the public easily, and quickly obtain accurate information, especially regarding doctor practice times, and room availability that can be accessed anywhere and anytime, other benefits of making this website are: This website is built to integrate information available from various health agencies. Based on the website created, patients can obtain information in the form of doctor practice schedules, and room availability at several hospitals in Jambi province. With this website, in addition to the availability of hospital and health clinic information, it also provides information about trend issues in the health sector that are developing in health in the community, so that people get broader health literacy.

CONFLICT OF INTEREST

All authors declared that there was no conflict of interest in the manuscript.

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