



CULTURALL HERITAGE INFORMATION SYSTEM (SIGAYA) IN KERAMAS VILLAGE USING EXTREME PROGRAMMING METHOD

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Abstract

Keramas Village is part of the Blahbatuh District, Gianyar Regency, Bali Province, with an area of 72 hectares. Keramas Village is one of the tourist villages in Gianyar Regency which is located on the 4 km long coast. One of the villages currently developing village potential-based tourism is Keramas Village. Keramas Village has a historical side that is still preserved. One of them is evidenced by the still sturdy existence of the statues which are housed in Besakih Temple and Kebo Edan Temple which have been designated as ancient sites. The head of the Keramas Tourism Awareness Group (POKDARWIS) Mrs. Eka Sri Wedayanti when interviewed said that the culturall heritage in Keramas village has not been optimally developed so far. this is because historical information regarding the existence of the culturall heritage is not generally known by the public or tourists visiting Keramas Village. This research will discuss the design and construction of a website-based cultural heritage preservation information system (SIGAYA) using the extreme programming method. It is hoped that this research can help convey information so that it can be more easily accessed by the public and tourists, thus making it easier for Pokdarwis to manage culturall heritage data and its potential.



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I. INTRODUCTION

Keramas Village is part of Blahbatuh District, Gianyar Regency, Bali Province with an area of 72 hectares. Keramas Village is one of the tourist villages in Gianyar Regency which is located on a 4 km long coastline. The village has a population of 7289 people, a village area of 72 ha, 35 ha of rice fields and 57.57 ha of moorland. Keramas village is located on the southern coast of Bali, which is close and easily accessible from the provincial city, regency city and suburbs. The distance of Keramas village from Denpasar, the capital of Bali province is 35 km, while the distance from the capital of Gianyar Regency is 3.5 km and takes 15 minutes to reach the sub-district. Blahbatuh city is 4 km away and the driving time is 20 minutes[1].

The development of technology today has a great impact in various sectors, including tourism. It

can be seen in the development of tourism villages to maximize the potential of the village for the welfare of the community. Keramas Village has a historical side that is still preserved. One of them is proven by the existence of statues housed in Besakih Temple and Kebo Edan Temple which have been designated as archaeological sites. Keramas Village is also famous for the art of Arja Dance which still maintains its existence to this day.

The village that is currently developing tourism based on village potential is Keramas Village. From the results of interviews with the Head of Keramas Village, Mr. I Gusti Ngurah Sarjana, it is stated that the village potential that has been in Keramas Village is mostly in the form of natural potential and historical heritage in the form of culturall heritage. Keramas Village has a historical side that is still preserved. One of them is proven by the existence of

statues located in Besakih Temple, Kebo Edan Temple and Puseh Amping Temple which have been designated as archaeological sites. In addition, Keramas village has been chosen as one of the tourist villages in Gianyar Regency which is full of beautiful charm. Keramas Beach as a beach with the top 10 best waves in the world is able to attract and bind both local and foreign tourists to always visit. Major events such as WSL Champions Tour, Garuda Tabako, Billabong and Quiksilver. Besides being famous for its beaches and waves, Keramas also has religious tourism in the form of Pancoran Solas. By sourcing from ancient springs, the existence of Pancoran Solas in Keramas village is highly utilized by the community both for daily needs and during religious ceremonies.

The head of the Keramas Village Tourism Awareness Group (Pokdarwis), Mrs. Eka Sri Wedayanti, when interviewed, said that the cultural heritage in Keramas village has not been optimally developed so far, this is because historical information about the existence of this cultural heritage is not generally known by the community and tourists visiting Keramas Village. This is a priority for Pokdarwis to introduce the potential in Keramas village in addition to the existence of Keramas beach waves which are sought after by foreign surfers. The Keramas Village Government together with the Keramas Village Pokdarwis are committed to introducing all the potential that exists in Keramas village so as to increase tourists visiting Keramas village.

II. LITERATURE

2.1. HTML (Hyper Text Mark Up Language)

A language that is often used to describe the shape of web pages. HTML is used to publish documents online. The basic directives in HTML are called tags. Tags are represented by a sign (<>). Tags that target documents or parts of documents must be written in pairs. Which contains a marked start and end [2]. To build web scripts in terms of servers or backends usually use PHP. To create dynamic web pages in PHP can use a database. In PHP the database that is usually used is MYSQL[3]. PHP is also a popular alternative because it is free and efficient for web development compared to competitors such as Microsoft's ASP[4]–[6].

2.2. Laravel

Taylor Otwell created a PHP-Based web framework called, which is intended to develop web applications using the Model View Controller pattern. The structure of the Laravel Model View Controller pattern is slightly different from the structure of the general Model View Controller pattern. Laravel has a route that bridges requests from users and controllers. The person in charge does not receive the request immediately. The advantage of the Laravel framework is the use of the Composer package

manager, which uses the Artisan Command Line Interface (CLI). Short syntax or programming code that is arguably easier to understand.

2.3. MySQL

Open-source database management system. RDBMS (Relational Database Management System). This means that the data stored in the database is organized in separate tables, to speed up data manipulation. It can be used to manage small to large databases. It can also be defined as a standard interface for relational management systems that run on local computers. There are also possibilities where users can find out where information is located or how information is organized[7][8]–[11].

2.4. UML (Unified Modelling Language)

UML is a visual modelling technique used in the design and creation of Object-Oriented Programming software. UML is a standard description or a kind of blue print that contains business processes that describe classes in a particular language. There are several UML diagrams that are commonly used when developing systems [12] :

- a. Use Case: An overview of the expected functionality of the system.
- b. Activity Diagram: An overview of the flow of activities in an ongoing system.
- c. Sequence Diagram: Description of interactions between objects in and around the system in the form of messages written over time.
- d. Class diagram: A description of the structure and description of classes, packages, and related objects such as inheritance and association.

2.5. Blac box Testing

Software quality testing that focuses on software functionality. The purpose of black box testing is to look for defective functionality, interface errors, data structure errors, performance errors, initialization and termination errors. Blackbox testing uses a tool for data collection called a user acceptance test[13].

2.6. ERD (Entity Relation Diagram)

A diagram that conceptually represents the relationship between the storage in the DFD diagram above. This ERD is used to model data structures and their relationships. ERD is used to reduce the complexity of compiling a good database [13][14].

III. RESEARCH METHODS

The method used in this research is the Extreme Programming method. Visual system techniques using UML (Unified Modelling Language) consists of Use Case Diagrams, Activity Diagrams, and Sequence Diagrams used in the manufacture of Object Oriented Programming software. The ERD design to visualize database relationships and UI

Wireframe to visualize UI design on web-based SIGAYA. For the programming language using PHP. On the Front-End side using the Laravel-vue framework and on the backend side using the Laravel framework. For the culturall heritage map distribution system, it is assisted by a javascript library called Leaflet.js which is open-source and has an easy-to-read source code, and is expanded with many plugins making leaflets easy to use and run efficiently on mobile and desktop devices. To display QR-Code, it is assisted by a library called simple qr code which is open-source. To ensure the process on the system is running according to user needs, this test uses the Black Box Testing method which is used to find defective functionality, interface errors, data structure errors, performance errors, initialization and termination errors[15]–[17].

Extreme Programming method is one of the methods used in software development and is widely used by application developers or information systems. The XP Method is an approach or software development model that tries to simplify the different phases of the development process so that this method is more adaptable and flexible. XP not only focuses on programming, but also covers all areas of software development. XP takes an "extreme" approach to iterative development, or iterative development cycles. The following is an image of the phases of the XP method:

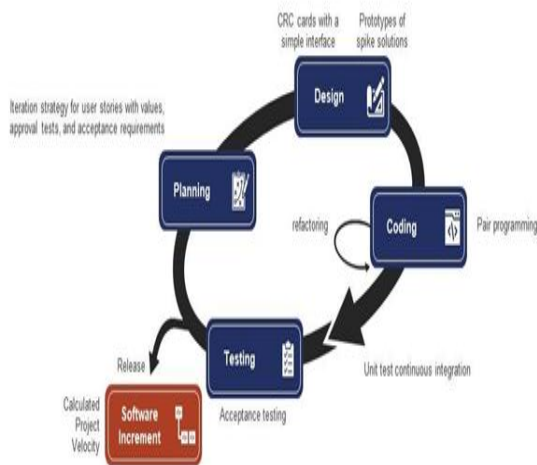


Figure 1. Extreme Programming Method Flow[18]

3.1. Planning Stage

The initial stage carried out is to identify problems in the research. At this stage, the researcher conducted an interview with the head of the Keramas village Tourism Awareness Group (Pokdarwis) Mrs. Eka Sri Wedayanti when interviewed said that the culturall heritage in Keramas village has not been optimally developed so far, this is because historical information about the existence of these culturall heritage is not generally known by the public or tourists visiting Keramas Village, so it requires a

system that can manage and digitize data based on a website with the following objectives:

1. Make it easier for tourism awareness groups (Pokdarwis) to manage and digitize data.
2. Make it easier for people and tourists to recognize culturall heritage in Keramas village.
3. Used to introduce the potential in Keramas Village to a wider community through the website, because it can be accessed easily.

3.2. Design Stage

In the second stage, the author designed UML (Unified Modeling Language) which was divided into Use Case Diagrams and Sequence Diagrams. The author also designed an ERD (Entity Relationship Diagram) for visualization of database structures and UI Wireframes for visualization of interface design. Use Case Diagram. Use Case Diagrams are used to illustrate the visualization of the relationship between user activities and the system. In the Admin actor Use Case Diagram, users get full access rights to the entire system to manage data by logging in as Admin. In the Guest actor Use Case Diagram, users can only view data managed by Admin without needing to log in (view only).



Figure 2. Use Case Diagram Admin & Guest

Activity Diagram is used to describe the relationship between users on the system for each process performed. The design of the Activity Diagram on the web-based Keramas Village Culturall Heritage SI is divided into 2 accesses, namely admin and guest. The process carried out is based on the Use Case Diagram. Especially for the admin, the data management process is broken down into the Add, Update, and Delete data processes. The following is an Activity Diagram for collecting culturall heritage data on a web-based Culturall Heritage Information System.

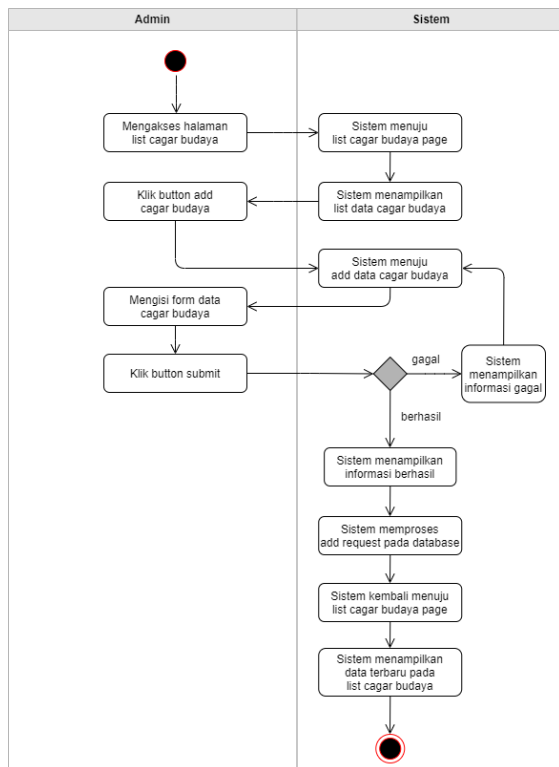


Figure 3. Activity Diagram Add Data Heritage Cultural

Admin accesses the menu or URL to the culturall heritage list page along with all culturall heritage data. Admin presses the add culturall heritage button then the system automatically goes to the add culturall heritage page. The admin then fills in the data form that presses the submit button, so that the system will process the add request on the backend. After that the data is inputted, then the status information will appear successfully and the new data is displayed in the culturall heritage list table. If it is invalid, it will display failed information and will return to the add form.

Sequence Diagrams are used to facilitate the depiction of how the system works for each process carried out by the user. The design of the sequence diagram on the web-based Keramas Village Culturall Heritage SI is divided into 2 accesses, namely Admin and Guest. Sequence Diagrams are made following the website framework architecture used to make it easier to understand and easier to implement in the coding phase. Admin as a user chooses the culturall heritage menu first. Then the web will display the process in the form of a culturall heritage page display. The Manage Culturall Heritage Sequence Diagram can be seen in Figure 4 below.

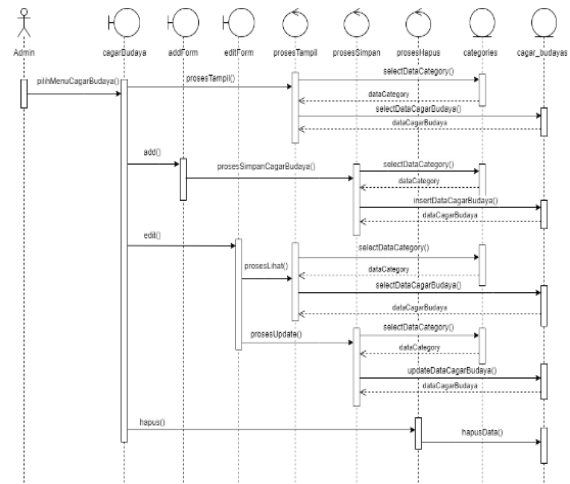


Figure 4. Sequence Diagram

Entity Relationship Diagram a diagram that conceptually represents the relationships between the storage in the DFD diagram above. This ERD is used to model data structures and their relationships. ERD is used to reduce the complexity of compiling a good database[19]. The database on the web-based Keramas Village Culturall Heritage SI uses SQL and MySQL software. The following are the results of the ERD design on the Keramas Village Culturall Heritage SI.

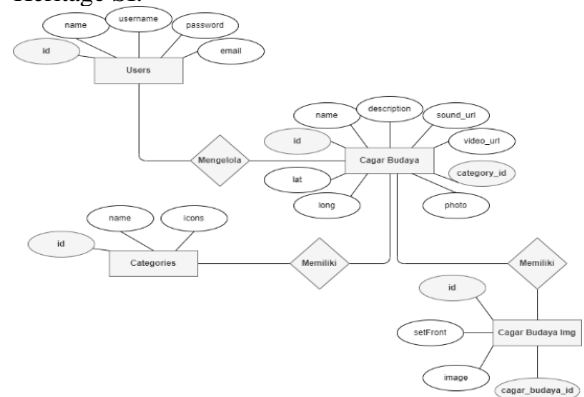


Figure 5. Entity Relationship Diagram SI Heritage Cultural

3.2. UI Wireframes

UI Wireframe is created to illustrate the UI design of each process in a system. The Wireframe level chosen is High Fidelity, meaning that the UI design describes a design that is similar to the one that will be implemented on the website, so that it is easy to understand and imitate during implementation in the coding phase. The following are the results of the Wireframes UI design in the culturall heritage data collection process.

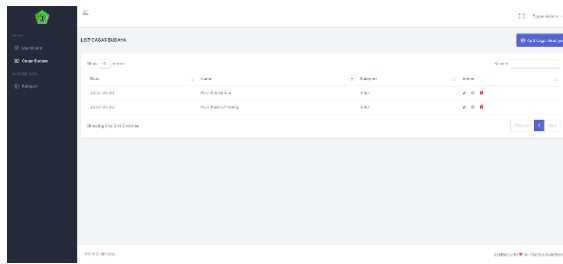


Figure 6. UI Design of Heritage List Page

The culturall heritage list page contains all culturall heritage data in the form of a table.

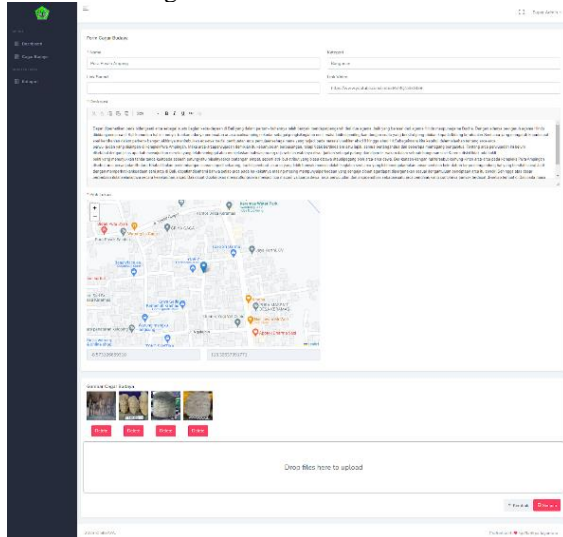


Figure 7. UI Page Add Heritage Cultural

If the admin presses the add culturall heritage button on the culturall heritage list page, the system will go to the add culturall heritage page containing a form for inputting category data, such as name, category, sound, video, description, location point and uploading images can be more than 1.

3.3. Coding Stage

The application stage and the process of developing a web-based GIS based on the design that has been designed in the previous stage. The web-based Culturall Heritage SI uses the Laravel framework combined with Vue.js and the Leaflet.js library for visualizing geographic data on the distribution of Keramas Village Culturall Heritage. The backend of the Culturall Heritage SI uses the Laravel framework.

3.4. Testing Stage

The SI Culturall Heritage testing stage is to ensure that the system is as expected and check whether there are errors in the input and output processes on the system. Testing is done with the Black Box Testing method. Black Box Testing is used to speed up researchers in finding inconsistencies in the system according to the input and output processes.

IV. RESULTS

4.1. Page Admin *List Heritage Cultural*

The culturall heritage list page contains a list of data using a datatable that contains date, name, category and actions that can be performed.

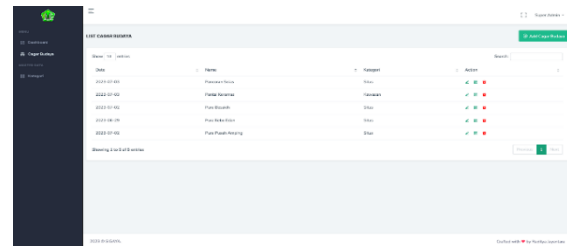


Figure 8. Page List Heritage Cultural

4.2. Page Admin Add Heritage Cultural

When the admin presses the add culturall heritage button on the culturall heritage list page, it will be directed to the add culturall heritage page form to input data such as the name of the culturall heritage, select a category, sound link, youtube link for video, description of the history of culturall heritage, culturall heritage coordinates using leaflets and upload images.

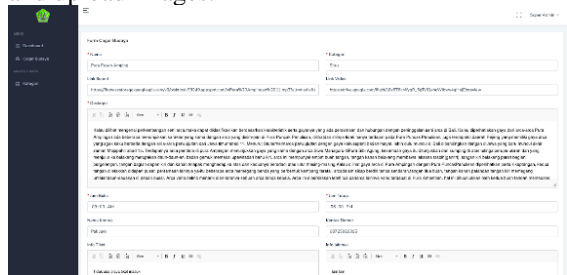


Figure 9. Page Add Heritage Cultural

4.3. Page Guest *List Heritage Cultural*

On the culturall heritage page there is a culturall heritage filter and a list of culturall heritage.

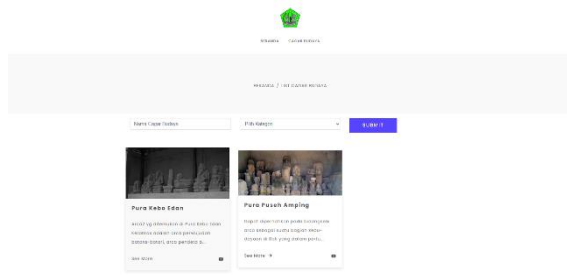


Figure 10. Page Guest List Heritage Cultural

4.4. Page Detail Heritage Cultural

If the admin chooses one of the culturall heritage, it will be directed to the details of the culturall heritage with more complete information such as sliders containing photos of culturall heritage, there is a description of culturall heritage, photo galleries that can be clicked to see more clearly, there is sound if you open this page, as for videos that can be taken from YouTube, and there is a distribution of coordinates of all culturall heritage that can be seen on the map below.

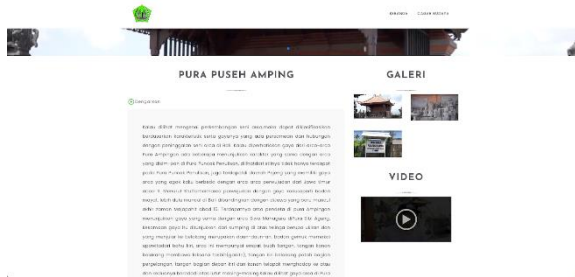


Figure 11. Page Guest Detail Heritage Cultural

Table 1. Test Results of Cultural Heritage Data Management with Black Box Testing Method

No	Scenario	Case	Expectations	Results
1.	Accessing the cultural heritage list page	User has not logged in	The system does not provide access to the cultural heritage list page	Valid
2.	Accessing the cultural heritage list page	Admin selects one of the cultural heritage data in the table	The system goes to the edit heritage cultural page to display the data of the selected one.	Valid
3.	Accessing the edit page with an unavailable ID parameter	Admin accesses URL with arbitrary ID parameter: url/heritage-cultural/id:abc	The system displays data information not found on the edit page or leads to 404 page	Valid
4.	Empty all inputs on the add heritage cultural form	Admin does not input anything in the add heritage cultural form	The system rejects and provides error information: Please fill in all the data on the form!	Valid
5.	Emptying inputs outside the important inputs on the add heritage cultural form	Admin leaves the sound link and video link inputs blank.	The system successfully added and provided successful information.	Valid
6.	Inputting an invalid photo format on the add heritage cultural form	Admin selects a non-photo format file PNG or JPEG e.g. GIF	The system displays error information: Format must be PNG or JPEG	Valid
7.	Does not change all or part of the data on the form when editing data	Admin does not change all or part of the data in the edit form heritage cultural	The system still changes the cultural heritage data and displays the information successfully.	Valid
8.	Delete cultural heritage data	Admin presses the delete data button on the cultural heritage list page	The system displays a delete or cancel pop up	Valid
9.	Confirm delete cultural heritage data	Admin presses the delete button on the confirmation pop up to delete cultural heritage data	The system deletes the category data and returns to the cultural heritage list page.	Valid

After the testing phase was complete, the researcher confirmed again whether there was anything to be changed or added to the system. Based on the results of informal interviews with the Chairperson of Pokdarwis, it is known that there are changes to the interface design on the system, especially on the Culturall Heritage List page. The Pokdarwis wants that the filter page displays the culturall heritage category which is directly displayed not in the select input so that it can be directly clicked and the responsiveness display can be better. This causes the need to iterate the stages of system development using the XP method again with the following results:

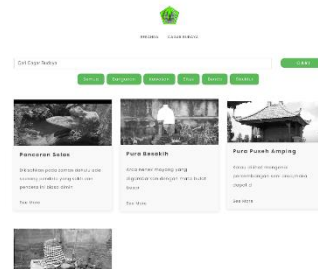


Figure 12. Page List Heritage Cultural

Table 2. Heritage Cultural Data List Testing Results 2nd Iteration

No	Scenario	Case	Expectations	Results
1.	Filtering cultural heritage names and heritage categories	Users search for cultural heritage names and categories	The system displays a list of cultural heritage data that matches the name and category.	Valid

After the 2nd iteration was completed, namely up to the testing stage, the research again confirmed to the Pokdarwis whether there was anything to add or change to the system. Based on the results of the interview, it is known that Pokdarwis has no more additions or changes to the system, so that with this system development using the XP method has been completed in 2 iterations.

V. CONCLUSION

Based on the discussion that has been described in this research entitled Culturall Heritage Information System (SIGAYA) in Keramas Village Using Extreme Programming Method, the author concludes that the web-based Culturall Heritage Information System was successfully built using the Laravel framework with a combination of vue.js and Leaflet.js plugin, simple QR-Code, dropzone. The web-based Culturall Heritage Information System designed and built can perform culturall heritage management and data collection related to culturall heritage. This web-based Culturall Heritage SI has also been tested for functionality using the Black Box Testing method which results in a system that can work well in each process carried out.

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