Web-based geographic information system for mapping religious tourism object

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Abstract. Based on the notes issued by the Garut Regency Tourism Office explained that the interest of the community to visit religious tourism objects in the Garut district region is relatively high. Attractions visited are generally in the form of a sacred tomb. Almost all districts in the Garut district have graves that can be used for pilgrimage. However, the visit of new tourists is limited to a few regions. The tourists generally come from outside Garut regency, which is spread throughout the provinces in Java. The limited information possessed by potential tourists, as well as the dissemination of information by related parties, can be the cause of the spread of the purpose of the visit to be limited as well as the number of tourists interested in visiting. One alternative solution that can be done by the Garut regency government, in particular, is by designing a geographic information system mapping web-based religious tourism objects. The research aims to design a geographic information system mapping web-based religious tourism objects that presents regional mapping that can explain the state of infrastructure and public facilities available on these attractions. The system design method used is object-oriented methods, namely the Rational Unified Process, which consists of several stages, including inception, elaboration, construction, and transition. So it is expected that the application of this system can increase the number and spread of tourists towards tourist destinations.

1. Introduction
One of the religious activities that many people do in general is a pilgrimage to graves that are considered sacred [1,2]. Based on information obtained from the Garut District Tourism Office, some tombs that are considered sacred by the community are found in several districts of Garut district, including in Karang Pawitan sub-district, Limbangan sub-district, Pameungpeuk sub-district, Cibiuk sub-district, and other sub-districts. However, the number of visitors is still concentrated in certain tombs, even though not a few visitors who come from outside the city and the province, this situation is a challenge for local governments [3], especially the local government of Garut district.

Based on observations and interviews conducted with several tourists visiting several different places, it can be concluded that the main obstacle to the number of tourists and its spread is the limited information that can be accessed or obtained by potential tourists. Based on information obtained from the Tourism Office of Garut local government that so far, promotional activities have been affected by religious tourism objects and are still being done conventionally [4].

Based on the information above, one alternative solution that can be done is to develop a system that supports the promotion of religious tourism. The system designed must be informative and interactive.
so that it can provide comprehensive information to potential tourists. Thus it is expected to increase the number of tourist visits and distribution of destinations for religious tourism.

The development of geographical information systems will provide comprehensive and interactive information because it is developed through the use of regional maps obtained through satellite imagery [5–8]. Thus the information presented is not only textual but is also supplemented by a map of the area and pictures of public facilities available at the place of the object. Besides, the route, distance, and conditions of the trip will be informed as well as alternatives that can be used.

The use of cellular telephones in the community, in general, has been able to access websites so that the development of web-based systems will be easily accessible to the public [9–12]. Through the design of user interfaces that are user friendly will make it easier for people to understand the features contained in the system. Thus it is hoped that the development of a web-based geographic information system will be an effective alternative solution to the promotion of tourism objects in Garut district.

2. Methods
RUP (Rational Unified Process) is a type of software development approach that is done repeatedly (iterative), focuses on architecture (architecture-centric), more directed based on the use of cases (use case driven). RUP is a software engineering process with defining well (well defined) and good structured (well structured). RUP provides a good structural definition for the life cycle of software projects. RUP is a software process product that was acquired by IBM in February 2003 [13]. The iterative process in global RUP can be seen, as shown in Figure 1.

![Figure 1. Iterative process of RUP [13].](image)

There are four stages in the rational unified process method which will be presented as follows [13]:

2.1. Inception
At this stage, it is the preparation stage that focuses on the system requirements based on the user's environment. Starting with setting system specifications, system boundaries, and defining the need for the system to be made (requirements).

2.2. Elaboration
The elaboration phase is more focused on system architecture planning. This stage can also detect whether the desired system architecture can be made or not. Detecting the risks that might occur from the architecture created. This stage is more on the analysis and design of systems and system implementation that focuses on the prototype of the system (prototype). At this stage, system modeling is developed by starting to identify actors, drawing use case diagrams, activity diagrams, sequential diagrams to class diagrams, which are then used as a reference for designing systems.
2.3. Construction
This construction phase focuses on developing components and system features. This stage is more on the implementation and testing of systems that focus on software implementation in the program code. This stage produces a software product which is a requirement of the initial operational capability limit.

2.4. Transition
This stage is more on the deployment or installation of the system so that it can be understood by the user and produce a software product, which is a requirement of the initial operational capability limits. Activities at this stage include user training, system maintenance, and testing.

3. Results and discussion

3.1. Inception
The system was developed using web technology facilitated by Xamp, which is integrated so that it is a package of several programming languages. As the end-user is the general public in the age group between 45 years - 60 years. This system can be accessed from cellular phones that have Android technology.

With such specifications, the design results will be supported by the programming language used starting from database design using Oracle, designing the main menu to designing the user interface using Java, and as a programming language that supports the use of web, technology is PHP. The use of this web technology can be accommodated by cellular phones with android technology, making it easier to access in mobile phones [14,15]. The application of this technology for the people of this age group does not require additional hardware, nor does it require specialized training in operating it.

3.2. Elaboration

![System architecture](image)

Figure 2. System architecture.

Figure 2 explains the architecture of the designed software system. The architecture explained the sequence of processes that occur since the system is executed by the user to display the status of the given message in the form of an information display. With this architecture, it will be easier for developers to detect errors that occur so that the software becomes reliable.
3.3. Construction

3.3.1. Interaction class diagram

![Class diagram of Interaction between tourist destination and tourist destination](image)

Figure 3. Class diagram of Interaction between tourist destination and tourist destination.

From the class diagram above, it is clear that the identified classes show the relevance of the business processes of tourist visiting activities to the destination of attractions. These classes include tourist class objects that are aggregated into location classes, facility classes, and infrastructure classes. Meanwhile, the number of vehicles and participants aggregated into bus and minibus classes. The class visit is the interaction between tourists with the destination of attractions and vehicles used.

3.3.2. User interface design. The resulting interface is a representation of the class diagram that was designed. So that it can be expected that there will be the relevance of the interface produced with the running business processes. Thus the application of this application system will provide benefits for tourists, especially for those who do not know much about religious attractions either the name of the object, the location or location of the route and the distance that can be travelled [3,5].
The interface is relatively easy to understand, so it will help the tourists to operate the application system. So it does not require special skills. Starting with opening the application, a map of the names and locations of religious attractions will appear. Easily the potential tourists will explore tourist attraction by utilizing the menu presented.

3.4. Transition
The results of the design are then simulated for potential users. From the audience with prospective users will get responses that address various aspects, as seen from Table 1.
Table 1. Test result.

| Software Component         | Response                                                                 | Indicator                                                                 | Follow up                  | Remarks |
|----------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------|---------|
| Completeness of features   | Can accommodate information needs about attractions that will be visited by potential tourists. | Content Information concerning location, distance, route and infrastructure conditions. | The system can be maintained. | OK      |
| User interface             | Simple and easy to understand for ordinary users.                        | Layout color, Font Type and Size, Icon, Picture.                           | The system can be maintained. | OK      |
| Response time              | Relative is quite high by using an android cell phone that has 2 gigabytes of RAM. | There is no delay.                                                        | The system can be used.     | OK      |
| Error message              | Give a fairly complete notification when an error occurs data entry.     | Have a notification every time an error occurs.                           | The system can be socialized. | OK      |

The results of testing some random tourists are drawn from Table 1. Based on Table 1, it can be concluded that the application system is relatively easy to operate and does not require special effort and expertise.

4. Conclusions
Based on the results and discussion, the geographical information system to map religious tourism objects developed provides comprehensive information because it combines location information that is equipped with coordinates consisting of latitude and longitude, distance complete with a map of the region and the route taken, facilities (related to infrastructure owned by the tourist attraction). The developed geographic information system can be used as a promotional activity for tourism services in the Garut regency government to increase the number and distribution of religious tourism destinations. Further research is needed to determine the impact of system development on efforts to increase tourism activities so that it can be used as a reference for local governments in increasing the number and purpose of tourists to visit religious tourism objects.

Acknowledgments
Authors wishing to acknowledge Sekolah Tinggi Teknologi Garut that supports and funds this research publication.

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