Development of general transportation applications in Garut City web-based

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Abstract. Garut city is one of the cities that is densely packed with transportation, especially on public transportation. The purpose is that there are still many people who do not understand the path that the public transportation passes, both in the city itself, outside the city and even foreign tourists. The purpose of developing this application is to find out where to go. In this study, researchers designed and built public transport transportation applications in the web-based city of Garut with the name Garut Anyar utilizing GIS technology in it. The application is useful for searching city transportation routes (Angkot) in Garut City so that users no longer feel difficulties in finding public transport to get to their destination, especially for migrants in Garut City. In addition, this application can display information about angkot routes so that it can add to the user's insight. The conclusion obtained from this study is the Garut Anyar application was successfully built and useful for every user who has used this Garut Anyar application, which has been tested 100 times a trial from the RSU route to Banyuresmi as evidenced by an application testing questionnaire that gets good grades.

1. Introduction
Transportation has a very important role to increase economic and regional growth because transportation is closely related to community activities [1]. Therefore, the implementation of the transportation system must be carried out effectively and efficiently, which means having high accessibility, sufficient capacity, smooth, fast, easy to reach, and affordable tariffs. But if observed, almost all cities in Indonesia, have problems in terms of traffic, especially in urban public transport or more commonly known as angkot. Angkot itself is still widely used by the community for daily activities.

The city of Garut is one of the most crowded cities for transportation, especially on public transportation, which is very large and has also spread in various regions. Angkot that have been circulating in various regions have different routes, not infrequently the public using public transportation must switch from one angkot to another to go to the desired location, this can be called a transportation route. The problem is that there are still many people who do not understand the path that the public transportation passes, both in the city itself, outside the city and even foreign tourists [2].

By asking the local community, but the solution is not yet effective and efficient because it still has drawbacks, which can still confuse angkot users who do not know the way in Garut City and also things like this do not save time in searching for angkot route information. Problems like this have resulted in a decrease in the desire of the public to use public transportation.
Garut Regency Land Transport Organization [2] stated that 60 percent of passengers in Garut had switched to online-based public transportation, thereby reducing the income of entrepreneurs and conventional public transport drivers. Ojeg and four-wheeled transportation online have been busy operating in Garut, especially in the city, and it is considered to have reduced the income of public transport businesses in the city. An angkot that usually can deposit Rp140 thousand, now Rp110 thousand, there is even a deposit of Rp100 thousand per day because of the lack of passengers.

Currently, information technology is an integral part of society, especially in big cities, not least in Garut. Garut is in the process of moving towards a digital-oriented society. The rapid rate of use of information technology is also supported by the development of telecommunications infrastructure, particularly data services.

Changes in people's habits are also seen in terms of getting information every day. Now the presence of digital media increasingly shifts the existence of conventional media such as newspapers or magazines. In addition to being more concise, web-based digital media also requires a faster time to convey information to the public. Judging from the development of technology today, where technology is very instrumental in daily activities. For example, information systems can be easily created, do not require the possibility of creating an angkot information system application in web-based Garut. using Google Maps to quickly get a place, traffic, and public transportation information from one source to provide easy searching for information and save time. Includes information systems in the field of urban transport.

Web-based can be used for a variety of different purposes. For example, web-based applications can be used to create invoices and provide an easy way to store data in the database [3]. This application can also be used to manage inventory; because this feature is very useful especially for the development of public transportation applications. Not only that, but web-based applications can also work to monitor the system in terms of appearance. Even the number of web-based applications is no longer counted, which can be designed and adapted to the needs.

2. Methods

Waterfall Development Method According to Pressman [4], the waterfall model is a classic model that is systematic, sequential in building software. The name of this model is actually the "Linear Sequential Model". This model is often referred to as the "classic life cycle" or the waterfall method. This model belongs to the generic model in software engineering and was first introduced by Winston Royce around 1970 so it is often considered ancient but is the most widely used model in Software Engineering (SE). This model approaches systematically and sequentially. Referred to as the waterfall because the step by step must wait for the completion of the previous phase and run sequentially [5].

Phases in the Waterfall Model according to Pressman's reference:

![Waterfall Method phase](image)
Hold the development of this website-based software using the waterfall method as shown in the stages contained in the waterfall model are as follows.

2.1. System Engineering
Software engineering is the first step to formulate the system to be built. This aims to understand the system to be built so that the system workflow can be understood. Elements or parts can include people, hardware, software, facilities, policies, and documents, it is all necessary to produce system level. And the design is responsible for creating and implementing a disciplinary process to ensure that customers and stakeholders' needs are satisfied with the high quality, trustworthy, cost-efficient and scheduled ways of fulfilling throughout the entire life path.

2.2. Analysis
The analysis is carried out on the problems faced and to determine the software requirements of the applications built. Summarizing a large amount of raw data into information that can be interpreted. All forms of analysis try to describe patterns consistently in the data so that the results can be studied and translated in a short and meaningful way, and for the development in the city of Garut is characterized by the increasingly high activity of movement/mobility in an effort to meet their needs. Immediate implications of these conditions trigger the emergence of basic problems, namely in terms of providing means of transportation.

2.3. Design
The design stage is the translation stage of the data that has been analyzed into an easily understood form and does not make mistakes in the display when the user accesses. Design generally takes into account aspects of function, aesthetics, and various other aspects with data sources obtained from research, thinking, brainstorming, as well as from pre-existing designs.

2.4. Coding
Coding is the stage of translating data that has been designed into certain programming languages. This programming language is a set of syntax and semantic rules used to define a computer program the logic requirements of a pseudocode or flowchart into a programming language both letters, numbers, and symbols that make up the program.

2.5. Testing
The testing phase is carried out on the software that has been built. The testing process focuses on the internal logic of the software and ensures whether the desired results are achieved or not.

2.6. Maintenance
Maintenance is the handling of a software that has been completed so that changes or additions can be made according to user requests.

The waterfall method or often called the waterfall method is often called the classic life cycle, where it describes a systematic and sequential approach to software development, starting with the specifications of user needs and then continuing through the stages of planning, modelling, construction and system submission to customers/users (deployment), which ends with full software support generated [6].

3. Result and Discussion

3.1. Result
Development of public transportation applications in the web-based city of Garut, is an application to present road information in the city of Garut, the path traversed by public transportation visually
displayed in the form of maps, this application is made on a web-based basis so that information can be more widely accessed via the internet so that it is expected to provide road and public transportation information in Garut City in a better way of development. This information system uses an appropriate method, starting from the analysis stage to the testing in making applications beginning with a survey to the field to be able to obtain the geographical data and supporting data needed, followed by making a digital map and web application to be able to present the map and this application provide public transportation route and route search facilities based on spatial data and non-spatial data owned by the City of Garut, and display it visually on a map so that it can make it easier for tourists or people who will travel to Garut City, especially those who will use public transport facilities.

The conclusion that can be drawn from the development of public transportation applications in Garut Kota is web-based as follows: After the coding stage is carried out, there are tests performed on each coding consisting of white boxes and black boxes. Testing is done by checking all statements in the program that is executed at least once. Testing is carried out on the system development process, namely testing code programs. Black box testing is done to test whether the system developed is in accordance with what is stated in the functional specifications of the system. The black box is also used to test the functions that exist in the system built by Pressman [4]. Tests and results of the black box test main page in Table 1.

| Testing      | Frequency | Frequency presentation | Total |
|--------------|-----------|------------------------|-------|
|              | Succeeded | Failed                 |       |
| Input Text 1 | 100       | 0                      | 100%  |
| Input Text 2 | 100       | 0                      | 100%  |
| Button       | 100       | 0                      | 100%  |
| Maps         | 100       | 0                      | 100%  |
| Mean of percentage | 100% | 0%                     | 100%  |

From Table 3.1 shows that the assessment of the Advanced Display of black box testing has an average of 100% and 0% respectively. So it can be concluded that the assessment of the results of 100 trials of the RSU route to Banyuresmi works well. Figure 3.1 White box test results for the second display with routes from the RSU to Banyuresmi:

![Image](image1)

**Figure 2.** White box test results for the second display with routes from the RSU to Banyuresmi.

Public Transportation application has been successfully developed, which is used as a media search for public transport routes in Garut Kota, making it easier to obtain information. This is evidenced by table 2 and 3.
3.1.1. Variable Ease of Use. The ease of use variable is to see the ease felt by the user in using the application that has been built. For assessment of ease of use, variables obtained results as in Table 2.

| No | User friendly | Average (M) | Frequency |
|----|---------------|-------------|-----------|
|    |               | SB | B  | KB | TB |
| 1  | Ease of understanding information given | 4.24 | 36 | 58 | 6  | 0  |
| 2  | Ease of operating the application     | 3.89 | 15 | 72 | 13 | 0  |
| 3  | Ease of understanding the result of application execution | 3.75 | 19 | 59 | 22 | 0  |
|    | Average Percentage | 23.33% | 63% | 16.67% | 0% |
|    | Total average per category | 3.96 |

From the table shows that the assessment of the ease of use variable has an average value of 3.96 which is in the interval 3.43 - 4.23 and belongs to the category "Good.

3.1.2. Content Variables (Content). Content variable, in this case, is the purpose of the information provided in this application in accordance with the needs and easily understood by the user. For content variables, the results are shown in Table 3.

| No | Content                                      | Average (M) | Frequency |
|----|----------------------------------------------|-------------|-----------|
|    |                                              | SB | B  | KB | TB |
| 1  | Purpose of the system                        | 4.2 | 28 | 68 | 4  | 0  |
| 2  | Information provided according to your needs and goals | 4.13 | 19 | 78 | 3  | 0  |
| 3  | The information provided is easy to understand | 4.24 | 34 | 61 | 5  | 0  |
|    | Average Percentage                           | 27% | 69% | 4% | 0% |
|    | Total average per category                   | 3.19 |
|    | Category                                     | "GOOD" |

From the table, it can be seen that the assessment of variable 3 has an average value of 4.19 and is included in the "Good" category. For a detailed questionnaire, calculation results can be seen in Annex D-5 table. The percentage of content variables in the graph is shown in Figure 3.2.

3.2 Discussion
Changes in people's habits are also seen in terms of getting information every day. Now the presence of digital media increasingly shifts the existence of conventional media such as newspapers or magazines. In addition to being more concise, web-based digital media also requires a faster time to convey information to the public.

Judging from the development of technology today, where technology is very instrumental in daily activities. For example, information applications can be easily created, do not require the possibility of making an existing angkot application in the web-based city Garut area. The rapid advancement of digital technology must be maximally utilized, especially used to support field activities. Using Google Maps to get a place, traffic, and public transportation information quickly from one source to provide easy searching for information and save time.
Including information application in the field of city transportation. The development of information technology is felt very rapidly, where humans have used information technology in all their activities. This application can also be used to manage inventory; because this feature is very useful especially for the development of public transportation applications. Not only that, but web-based applications can also work to monitor the system in terms of appearance. Even the number of web-based applications is no longer counted, which can be designed and adapted to the needs.

Development of public transportation applications in the web-based Garut City area, is an application to present road information in the city Garut area, the path passed by public transport visually displayed in the form of maps, this application is made web-based so that information can be more easily accessed widely via the internet so that it is expected to provide information on roads and public transport in the Garut area of the city in a better way of developing through the internet network, especially in using web media to support programs. This application uses the appropriate method, starting from the analysis stage to the testing in making the application begins with a survey to the field to be able to obtain the geographical data and supporting data needed, followed by making a digital map and web application to be able to present the map and this application provides search facilities for public transport routes and routes based on spatial data and non-spatial data owned by the City of Garut, and display them visually on the map so that it can make it easier for tourists or people who will travel in the Garut City area, especially those who will use public transport facilities.

4. Conclusion
The application is useful for searching city transportation routes (Angkot) in Garut City so that users no longer feel difficulties in finding public transport to get to their destination, especially for migrants in Garut City. In addition, this application can display information about angkot routes so that it can add to the user's insight. The conclusion obtained from this study is the Garut Anyar application was successfully built and useful for every user who has used this Garut Anyar application, which has been tested 100 times a trial from the RSU route to Banyuresmi as evidenced by an application testing questionnaire that gets good grades.

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