Designing of Eid Al-Adha Qurban Meat Stock Information System to Optimize its Distribution

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Abstract. The purpose of this study is to design information systems to optimize the distribution of Qurban meat in Eid Qurban. During this time each local Qurban organizer carried out their respective Qurban activities. The meat supply in some region have an uneven distribution of qurban meat. They did not know the number of qurban meats in other areas and their distribution. Therefore, as a solution to optimize the distribution of qurban meat, the author designed an information system for searching and requesting qurban meat based on website. This system is designed for each Qurban organizer so that they can inform about the qurban meat stocks which can be requested by another organizer. This research used experimental method. The system designed using the A-star algorithm to find the closest location. The programming languages used are PHP and JavaScript programming languages. While database management used MySQL. This system is applied to search for excess qurban meat stock at the nearest location. The result is that the application could function properly and ready to be used in the public. The existence of this designed system is expected to help the process of distributing qurban meat to become more optimal so that the social objectives of the celebration of the Qurban feast are achieved.

1. Introduction
At present, in eid al-Qurban Day, most of the organizers of qurban activities in the regions carried out their respective activities and they distributed qurban meat to the surrounding communities. They do not care about the presence or absence of qurban animal slaughter in other areas, especially those that close to their location. Sometimes, at a particular location, the sacrificed animals are not in a big amount even though the number of poor people is high. Therefore, they need more supply of sacrificial meat from another location that has a big amount of sacrificial animals. Because one of the social goals in the implementation of Sacrifice in Eid al-Adha is to give happiness for poor people through the distribution of qurban meat. Ideally, most of the meat from the qurban animals is distributed to the poor people and also the closest neighbours. Therefore, the activities of Eid al-Adha are not only direct worship to Allah SWT but also by social activities to another people, through distributing qurban meat to others and not only limited to Muslims but also non-Muslims as well[1]. However, every year in the distribution of qurban meat on the Eid al-Adha Day, there is often inequality between regions because not all regions have the same ability to slaughter qurban animals. For example, if A village slaughters eight cows, B village only slaughter a sheep. Even worse, C village cannot slaughter animal for qurban. So that the poor people in C area will not get the qurban meat. This can be caused by the absence of coordination between the qurban committee in each region, so that in certain locations there can be excess or shortage of qurban meat stock. Therefore, a system for managing qurban meat distribution is needed to facilitate a coordination between the qurban committees in the region in order to overcome the problems.
The purpose of this study is to design a web-based application using A-star algorithm[2] that could facilitate the coordination among qurban organizers in each region, so that they could cover the lack of qurban meat for the community. This system provides information on location, availability of qurban meat stocks, and the number of recipients in each region. In addition, this application can display the route to the location [3], and visualize location maps by integrating this system on Google Maps [4].

2. Method

2.1. A star Algorithm

A star (A*) algorithm that developed by Hart et al.[2] is one type of algorithms that used to solve cases related to path finding. It was designed to find the problem solution about the shortest path between an origin location and a destination location. Path finding result using the A* algorithm is said to be complete and optimal because it applies heuristics. Heuristics are values that owned by each node that will guide A* algorithm to get the desired solution[5]. As an example, the application used to avoid virtual human's obstacle and navigate via optimizing shortest path [6] as well as find the optimal path from the source node to the destination node (base station) with regard to some parameters of sensor nodes[7].

2.2. Google Maps API

Google Maps API is a service provided by Google for users to utilize Google Map in developing applications. It provides several features to manipulate maps, and add content through various types of services that are owned and allows users to build applications on their website. It can provide open-access route planning data for several independent or mixed transportation modes, including walking, cycling, and driving. Several examples of the applications that using Google Maps API are to acquire travel costs at grid level[8], drive cycle detection[3], guide tourist during vacation[9] and find shortest paths on real road networks[10].

2.3. Haversine Formula

Haversine formula is a method to determine the distance between two points by calculating that the earth is not a flat field but is a field that has a degree of curvature. The Haversine Formula method calculates the distance between two points based on the length of a straight line between 2 points on longitude and latitude[11].

2.4. Designing Steps

The first step in designing this application is to design the system. At this stage, analysis would be carried out to determine the needs that must be met.

2.4.1. Functional Requirements Analysis

Analysis of functional requirements is a description of the processes regarding the system that will run on the application designed. The use case diagram of the application is shown in Figure 1.
Optimasi Distribusi Daging Kurban

Admin

Member

Register

Admin

Processing

Edit Data

Delete Data

Login

Insert Data Masjid

Data Stock & Recipient Processing

Account

Search Stock

Inbox / Outbox

Result Confirm

Profile

Edit Profile

Logout

Figura 1. Use Case Diagram

Character Definition:

1) Admin: a person who conduct maintenance on application and people who carry out the maintenance on the application also have the right to change or delete data.

2) Member (mosque): people who register, enter the mosque location data, update stock availability and number of recipients, change location data, and find locations that have the availability of excessive meat qurban stock if the member stock (mosque) has a deficiency status.

Use-Case Definition:

1) Register, is a registration process for members.
2) Login, is a process for logging in.
3) Admin Processing, is a process for editing or deleting user data.
4) Account can load member profile data, change profile data and logout.
5) Data stock and recipient processing, is a process for updating meat stock data and number of recipients.
6) Search stock, is a search process to get the closest location that has excess meat stock.
7) Inbox / Outbox, is a breakdown if you have requested stock to another location or stock request from another location.
8) Result Confirm, is the confirmation result from the inbox / outbox.
9) Profile, is a member profile page.
10) Edit Profile is to change profile data.
11) Logout is the process of deleting the login session.

Several scenarios for searching meat stocks is shown in Figure 2. The input assumption for this scenario is 100 kg. The number of areas closest to the available stock is limited to three locations.
Figure 2. Searching Scenario

Information:
1) Blue text for stock availability fulfilled.
2) Green text for inadequate stock availability but can still order stock if a location that has a lot of stock is found.
3) Red text for stock availability that is not met and from the search results no location is found that has a lot of stock.

2.4.2. Database Need Analysis
In designing the database, the Entity Relationship Diagram (ERD) will be discussed. ERD can describe the entire relationship of the entity group and how each entity operates in the application. The ERD of this application is shown in Figure 3.
Explanation:
1) User table, used to process admin and member (mosque) data that can be used to log in.
2) Mosque tables, used to store mosque data.
3) Save request table, used to store request data to other locations.
4) Sent request table, used to store data if there is a request from another location.

2.4.3. Analysis of Non-Functional Requirements
Analysis of non-functional requirements is an analysis of the needs outside the system to be made, this analysis is required for non-functional requirements will support the performance of the application to be made. The following is the user interface or user interface (UI).

1) Home page
2) About page
3) Register page
4) Login/Logout page
5) Insert Data Masjid page
6) Admin page
7) Member page
8) Profil page
9) Ubah Data page Profil
10) Search Stock page
11) Inbox/Outbox page
12) Result Confrim page

3. Results and Discussion
This section will explain about the results of testing the system that has been designed. Testing is done by observing the results of execution through test data and checking the functionality of this application.

3.1. Analysis of Front Page
The front page is shown in Figure 4.

![Figure 4. Front Page](image-url)

On this page, system can display the geographic information the location listed in the map visualization. Additionally, it can show the information the number of mosques registered, the total meat of qurban, the total number of recipients from all the mosques registered, and menus (about, register, and login menus)
3.2 Analysis and Testing of Register Menu

To use the features in this application, the user must register by filling out the register menu which consists of e-mail, username, and password. If the user fills out the registration form correctly then the system will go to the start page along with a notification as shown in Figure 5.

![Register Menu](image)

**Figure 5. Register Page and Successful Notification**

However, if the registration form is not filled in correctly the error message will be displayed on the screen.

The results of testing the registration functionality are shown in Table 1.

**Table 1. Registration Functionality Testing**

| Input Data | Case Data and Test Results (Normal Data) |
|------------|-----------------------------------------|
| Expected   | Registration data form: Fill in the form|
| Observation| Data stored and display a notification successfully register |
| Conclusion | Functioned |

| Input Data | Case Data and Test Results (Error Data) |
|------------|-----------------------------------------|
| Expected   | Registration data form: form blank / empty line / email format does not match. |
| Observation| Error Message |
| Conclusion | Functioned |

3.3. Analysis and Testing of Login Menu

To enter the member or administrator page, the user must fill in a login form consisting of a username and password as shown in Figure 6a. If the user fills in the username and password correctly, the system will open an administrator page (if the user is an administrator) or member page (if the user is a member who has filled in the mosque data) or a mosque data insert page (if the user has not filled the mosque data). However, if the username and password fields do not match or there is one or both of them that are not filled, the system will display an error message as shown in Figure 6.
The results of testing the login functionality are shown in Table 2.

| Case Data and Test Results (Normal Data)       |
|-----------------------------------------------|
| Input Data                  | Login Form data: fill in the form |
| Expected                     | Enter the member / admin page and the notification successfully login |
| Observation                  | Go to page member / admin notifications successfully login |
| Conclusion                   | Functioned |

| Case Data and Test Results (Error Data)       |
|-----------------------------------------------|
| Input Data                  | Login Form data: blank form / blank line / username and password are not match. |
| Expected                     | Error Message |
| Observation                  | Error Message |
| Conclusion                   | Functioned |

3.4. Analysis and Testing of Search Stock Pages

On the stock search page, users can search for the availability of meat by filling in the required fields according to the amount needed such as the display in Figure 7. Then, the user selects the search stock button. Furthermore, the system will display search results from stock. Based on the amount of meat qurban needed by the user, the system will look for excess meat stock from the nearest location.

Testing is done by entering the amount of stock needed. Then, the system will look for qurban meat stocks available at the nearest location. If in the system displayed the closest location that
can meet the needs of qurban meat, the system will display that location. However, if in the nearest location the available stock is not sufficient for the amount of input needed, then the system will search the second closest locations that have qurban meat stocks that can meet the needs of qurban meat. Then, the system will add the available qurban meat stock from the location, if it is sufficient, the system will display two locations. This system can search and add the available stock up to three locations as shown in Figure 8.

![Search Results in Three Locations]

**Figure 8. Search Results in Three Locations**

The results of testing the search stock functionality are shown in Table 3.

**Table 3. Search Stock Functionality Testing**

| Input Data       | Expected                                             | Observation                                                                 |
|------------------|------------------------------------------------------|------------------------------------------------------------------------------|
| Search stock     | Search for qurban meat stock available at the nearest location | If the search button is pressed by the user then the system will search and display the results |
| Form: fill in the form (number) | If the search button is pressed by the user then the system will search and display the results | If the search button is pressed by the user then the system will search and display the results |
| **Conclusion**   | Functioned                                           | Functioned                                                                   |

**4. Conclusion**

The system that has been designed can be functioned properly. This system can display the information and update the stock availability, number of recipients, inbox-outbox function, searches to the three closest locations that have available stock, as well as do the result confirm stock search and stock demand. The A* algorithm can be used to find qurban meat stock available at the nearest location. In addition, the system can integrate with Google Maps to display the location in the form of a map and route the original location to the destination location.
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