Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF MOBILE BASED FLOOD VOLUNTEER, STOCK, AND ASSET MANAGEMENT SYSTEM

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Bachelor of Computer Engineering Technology (Computer Systems) with Honours

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DEVELOPMENT OF MOBILE BASED FLOOD VOLUNTEER, STOCK, AND ASSET MANAGEMENT SYSTEM

ASYHRAFF FARHAN BIN MIOR KARIM

A project report submitted in partial fulfilment of the requirements for the degree of Bachelor of Computer Engineering Technology (Computer Systems) with Honours

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DEDICATION

Alhamdulilah, praise to Allah S.W.T. Every challenging work needs effort as well as guidance from elder especially those who are we close to.

This work is wholeheartedly dedicated to:

My Parents who been my source of inspiration and gave me strength when I am about to give up.

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Lastly my supervisor, who guided and helped me in accomplishing this proposal.

ABSTRACT

Flood is the most frequent natural disaster occurring in Malaysia. It is often affected by the monsoon season between mid-October to the end of March which causes flooding. These floods happen every year especially at the east and west coast of Malaysia and causes massive casualty every year. There are 189 river basins in Malaysia, including Sabah and Sarawak (89 are in Peninsula Malaysia, 78 in Sabah, and 22 in Sarawak), with the main rivers going straight to the South China Sea, and 85 of them are prone to recurring floods. When this happens, the government aids the victim in term of food, logistic and safety. Majlis Keselamatan Negara (MKN) develops scalable plan that optimize all available asset and stock item to mitigate the harmful effects of flooding. MKN also enlist the community's help by recruiting volunteers to help in the relief effort. Even with this method, the damage causes by these floods are increasing year by year. This paper try to address this issue by developing a mobile-based flood volunteer, asset, and stock management application. The application will be using Firebase, a Backend-as-a-Service (BaaS) as its database. It will enable the staff to manage all the resources available to them efficiently.

ABSTRAK

Banjir merupakan bencana alam yang paling kerap berlaku di Malaysia. Pada masa musim tengkujuh yang di antara pertengahan Oktober hingga akhir bulan Mac merupakan waktu yang berlakunya banjir. Terdapat 189 lembangan sungai di Malaysia, termasuk Sabah dan Sarawak (89 di Semenanjung Malaysia, 78 di Sabah, dan 22 di Sarawak), dengan sungaisungai utama terus mengalir menuju ke Laut China Selatan, dan 85 daripadanya terdedah kepada banjir yang berlaku berulang kali . Banjir ini berlaku setiap tahun terutama di pantai timur dan barat Malaysia dan menyebabkan angka korban yang besar setiap tahun. Apabila ini berlaku, kerajaan akan membantu mangsa dari segi makanan, logistik dan keselamatan. Majlis Keselamatan Negara (MKN) Menyusun sebuah rancangan yang berskala yang mengoptimumkan semua aset dan stok barang yang ada untuk mengurangkan kesan buruk dari banjir. MKN juga meminta bantuan sukarelawan untuk membantu mangsa-mangsa banjir. Walau bagaimanapun, kerosakan yang disebabkan oleh banjir ini meningkat dari tahun ke tahun. Maka untuk menangani masalah ini sebuah aplikasi pengurusan sukarelawan, aset, dan stok berasaskan telefon bimbit. Aplikasi ini akan menggunakan Firebase, Backend-as-a-Service (BaaS) sebagai pangkalan data. Ini akan membolehkan kakitangan menguruskan semua sumber-sumber dengan cekap pada masa kecemasan.

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@ - Symbol used to access resources in an Android project.

LIST OF ABBREVIATIONS

MKN	-	Majlis Keselamatan Negara
GUI	-	graphic user interface
VSIIS	-	Volunteer Service Integrated Information System
MOHW	-	Ministry of Health and Welfare
RFID	-	radio-frequency identification
ERD	-	Entity Relationship Diagram
IDE	-	integrated development environment
BaaS		Backend-as-a-Service
APK	-	android application package

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CHAPTER 1

INTRODUCTION

1.1 Background

Malaysia is a tropical country that often affected by the monsoon season between mid-October to the end of March which causes flooding. These floods happen every year especially at the east and west coast of Malaysia and causes massive casualty every year. When this happens, the government aid the victim in term of food, logistic and safety. Masjlis Keselamatan Negara (MKN) develops scalable plan that optimize all available asset and stock item to mitigate the harmful effects of flooding. Current flood management system involved a four phases approach which are prevention/mitigation, preparedness, response and recovery (Mohamad Yusoff *et al*., 2018) .MKN also enlist the community's help by recruiting volunteers to perform roles that require less technical training, allowing professionals officials to focus on the more highly specialized roles. To manage all these resources a systematic management system is used to allocate resources to the necessary location. Even with this method, the damage causes by these floods are increasing year by year as the system is not able to mitigate the damage done. A mobile application can be used as a solution to manage the resources that is used in a flood management system thus making the process faster and more efficient.

Due to severe flood situation ,there are many alternatives in designing flood management system for various situation to solving the flood problem in Malaysia (Hassan Gillani *et al*., 2021). (Berbakov, 2017) made an application that enable user to cooperate in mapping emergency using google map and pictures taken of the area.

As in this case, the mobile-based flood management system will be focusing on the volunteers, asset, and stock item resources. The volunteers will be able to register themselves using the mobile application and choose the volunteer work they want to join. The staff will be able to keep track of all the volunteer, asset, and stock in the application. They also will be able to register the information for asset and stock. Lastly the staff will be able to create events that volunteer can register using the application.

1.2 Problem Statement

The problem of disaster management system is not the lack of technology or the existence of relevant information. It is often the lack of accessibility of the information. As having the relevant information on the right person during a right time can be crucial in carrying out respond to a flood. The capability to use information to manage, discover and critically evaluate the situation in a faster pace are the key solution for the flooding problem.

These days mobile devices are preferred compared to computer due to the portability of it. The platform has become the best method method to distributing information and manage the information. It can serve as a two-way communication between the officials and the users. This can be seen as many governments' mobile-based application are developed as they are effective at collecting, managing, and sharing information. Volunteers can easily apply themselves using the application and knows the relevant information needed on the task that are given to them. The relevant asset and stock item will easily be account before, during and after a flood disaster. This will make immediate response to flood more efficient and has less miscommunication.

Lastly, organization rely on paper documentation for every stock or asset transaction. Paper documentation may can take up a lot of space that should be usable for other needs as the more documentation needs to be saved, the more paper are used. Besides that, security

issues are critical for every organization in safeguarding information paper having the disadvantage of easily getting lost, mistreated, or even destroyed while digital data can easily be protected and be made backup.

1.3 Project Objective

The aim of this project is to develop a flood volunteer, stock, and asset management system. There are three objectives as listed below:

i. To keep track and gather volunteer, stock, and asset information using the application while utilizing Firebase as the backend of the application.

ii. To develop a mobile based flood volunteer, asset, and stock management system that is user friendly.

iii. To test the efficiency of the application by doing a survey.

1.4 Scope of Project

The mobile-based application will be able to authenticate volunteers that registered. An email will be sent to them for verification. It will also be able to show the volunteers information to the staff. The asset and stock item will be able to be added to the database using a graphic user interface (GUI). The information will then be displayed. The volunteer will be able to join volunteer work setup by the staff. Meanwhile, the staff will be able to keep track of volunteers, stock, and asset through a list. They will also be able to edit this information. The staff will be able to organize volunteer work in case of a flooding.

Previous projects of mobile application development encounter problem due to the knowledge needed to make the app. The application needs to authenticate users logging in and able to keep the information in a database. Firebase being a BaaS significantly decrease

the difficulty of these task as it has an in-built feature that enable developer to easily implement these features in their application.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Due to being a tropical country, Malaysia often affected by the monsoon season between mid-October to the end of March which causes flooding. The east coast of Malaysia especially prone to flooding during these times. MKN efforts to assist during the natural disaster tends to be late due to the unpredictable nature of the floods. The consensus to solve this issue is by having a systematic management system to smooth out the rescue effort. A mobile based flood volunteer, asset and stock management system is one of the key parts to the system.

Research on this project focuses on learning how manual flood management is handle and applying manual flood management system to the mobile application. It will also focus on how to design and build an application that suited for emergency and improving upon existing flood volunteer, asset, and stock management system.

2.2 Previous Related Project Research

2.2.1 Flood Management Research

The flood disaster tends to overwhelm local capacity and requiring national or international level of assistance. Flood being the most known frequent and most devastating disaster worldwide especially in developing countries. In Malaysia, its estimated damage caused by flood exceed one billion ringgit. The article also states the common point to

improve in the ability of risk and emergency management is the need for better information (Mohd Taib *et al*., 2016).

This paper (Khalid & Shafiai, 2015) provide insight on the issue relating to the role of the delivery system by the government to the flood victims in Malaysia. The delivery system in flood management uses application of technologies in flood control, forecasting, warning, and evacuation systems. The delivery system is developed by classifying stages of disaster management:

i Flood Forecasting and Warning System (Pre-Disaster)

- To reduce residual risk through early warning systems and measures. ii Flood Relief Machinery (During Disaster)
- The Natural Disaster Relief Committee coordinate relief operations to aid flood system in an orderly manner.

iii Flood Management Emergency (During Disaster)

- To help in organizing flood operation during disaster making sure everything is in order.

iv Funding and Aid Delivery System (Post Disaster)

- Financial allocation in area such as physical development and flood victims.

2.2.2 Flood Management Application

A plethora of method can be used to detect and report flood by the general population such social media, online reporting and mobile applications were used as a tool for citizen to

detect and report floods (See, 2019). Crowdsourcing also enable for assessing damage in a post flood scenario as (Schnebele *et al*., 2014) developed a methodology to generate a road damage map for New York City after Hurricane Sandy using merging government data with videos from YouTube and Twitter to fill in gaps in information. This paper founds that having the government and citizen involvement in a volunteer and notification system can enable faster information collection about the emergency *(Yang et al*., 2018).

2.2.3 Volunteer Management System

Building a volunteer management system enables us to help in the effort in decreasing the damage causes by flooding, (Chen *et al*., 2017) designed and build an independent Volunteer Management System using the OPEN TECHNOLOGIES to help the operations of volunteer service business for the Taichung Volunteer Service Promotion Centre. The proposed system works independently and can export data to the government's Volunteer Service Integrated Information System (VSIIS) for volunteer to report their findings to Ministry of Health and Welfare (MOHW). The source code of the proposed system being open to the public, enable volunteers to join in developing the system thereby continuously improving the system. In this article the author also proposed a volunteer service life cycle as seen in table 2.1 that can be adopted to the project with stock and assets variables being inserted.

Table 2.1: Life Cycle of project in (Chen *et al*., 2017)