



**UNIVERSITY OF THE PHILIPPINES
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Master of Information Systems

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**BARANGAY HELPDESK SYSTEM WITH SMS FEATURES FOR TEXT BLAST
ANNOUNCEMENTS**

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ABSTRACT

As the information is widely available on Facebook for announcements and such, not everybody, is still, has access to the social media. And there are tendencies that these announcements are not often visible. SMS based alternatives from a legitimate source could be also an effective way for information dissemination. The Barangay Helpdesk System with SMS Features for Text Blast Announcements goal show the possibility of increasing the reach of communication and dissemination using combined web-based and SMS solution. The proponent used several web technologies, along with integration with Globe Labs API, allowing the web application and the mobile device interact with each other via web browser to SMS. After successful integration, the methodology was tested first with individual subscriber before moving on to multiple recipients. Keyword based sending was also enabled, and data has been provided for preset replies in the system. Overall, the system is working on its initial version and such development in wider scale is feasible for future works.

Keywords: SMS, SMS-based, GlobeLabs API, Subscription, Keyword-based sending.

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Chapter I

INTRODUCTION

As the information is widely available on Facebook for announcements and such, not everybody still, has access to social media. And there are tendencies that these announcements are not often visible. There are also tendencies that the posts online can be malicious or misinform the target audience. Also, in times of pandemic, we need constant updates and guidelines, especially from local barangay.

Improved reach for information dissemination, ensuring the legitimacy of content being broadcasted to registered recipients via SMS. The system can also serve as initial triage for inquiries before proceeding to the barangay hall itself, thus, saving time from travelling back and forth.

The major focus of the development of the system is to show the possibility of increasing the reach of communication and information dissemination through mixed implementation using web technologies and SMS implementation with minimal to low usage of hardware modules. Though Facebook communication already exist, there are still limited information reach and engagements in the current setup. SMS is primarily available than mobile data even in this age.

Chapter II

REVIEW OF EXISTING ALTERNATIVES

Facebook is widely available at this current technology age. Several functions are being utilized in many ways. It also offers different platforms according to purpose. One of the utilized features is the Facebook Pages, wherein it could serve like a Facebook profile but dedicated to its designated purpose. In this modern age, one of the drawbacks of the social media is the ability to share its contents to other audiences, including fake news. According to the group of researchers in Princeton University, they were able to identify that Facebook is the worst perpetrator of fake news. The ability of Facebook to have reach and impressions can affect the quality of information can be delivered to target audience, therefore, quality could be compromised. Impressions and reach, as defined, is the number of times the content is displayed, and the number of people who see you content (Felippelli, 2019).

SMS is a widely available means of communication, making it a universal service (Triggs, 2013). Several uses of SMS are incorporated with our daily lives as part of mobile communication. Other services are still using this technology as it has still better reach to people. One example is a text blast system. SMS can be applied with different disciplines such as combined hardware and software integrations using microcomputers and GSM modules. Also, part of our daily lives is the internet and the websites that we can access. Technology allowed SMS to be integrated in the web development by using API in order for the web and SMS to interact with each other, in a secured manner. By establishing a connection between the web application and SMS integration, we can manage to cut the cost of hardware maintenance, let alone if this would be hosted on cloud.

There are no available documentation for the current system. Social media interaction through Facebook is one of the offsite communication available, the only way to increase its organic reach ad impressions. Other options for information dissemination include human intervention like house visits and word of mouths. One of the drawbacks of the current setup, especially in Facebook, is that anyone could take the identity or ownership of a certain page or profile. Also, accessible details to the public can compromise data and security. Recent situations include the surfacing of empty and duplicate Facebook accounts last June 2020 that occurred in the Philippines. Any sensitive data stolen can be used maliciously.

The researcher would like to propose the idea of having a web-based service desk setup that would incorporate the use of both web and SMS technologies to improve the reach of legitimate information dissemination to the constituents. This way, we can reach out to other persons that chose to opt out to social media, to receive latest updates from the barangay itself. Setup would be done and still ensure the authenticity of the source of information being sent out to the subscribers, while providing convenience through SMS send and receive features. An initial design would be proposed in this topic and can be improved further by other people. The study aims to show that such approach can be a valid solution to address the problem and apply web and SMS based solutions.

Chapter III

PROJECT DETAILS

A. Overview

The web-based system is basically a website that allows interaction between the subscribed users and the site administrators. The subscribers would be able to communicate via SMS, and this will be received by the site administrator via the web console. Then, the administrator can send messages to its subscribers, in a 1:1 basis, or across the subscribed users, in a text blast manner.

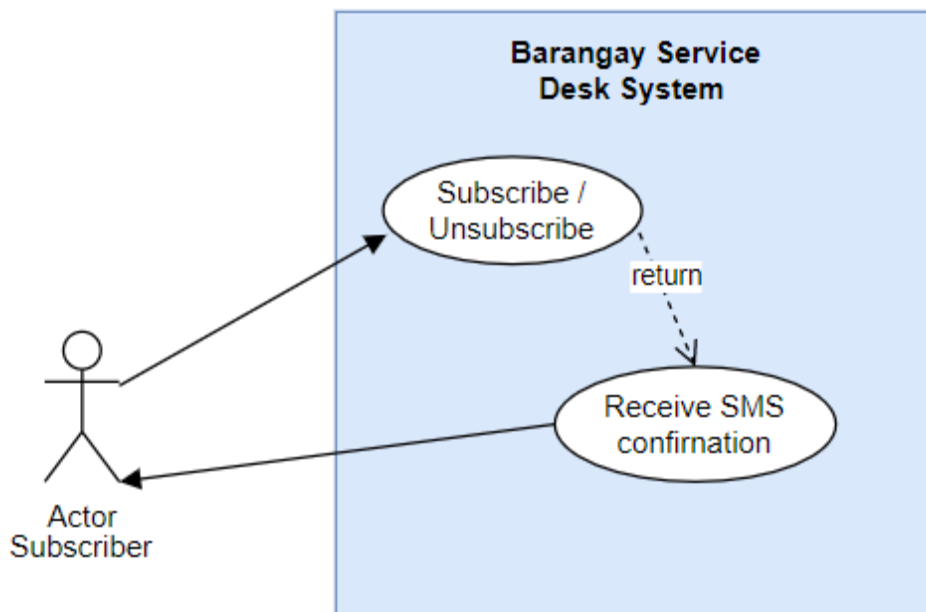


Figure 3.1. Use Case Scenario for subscription

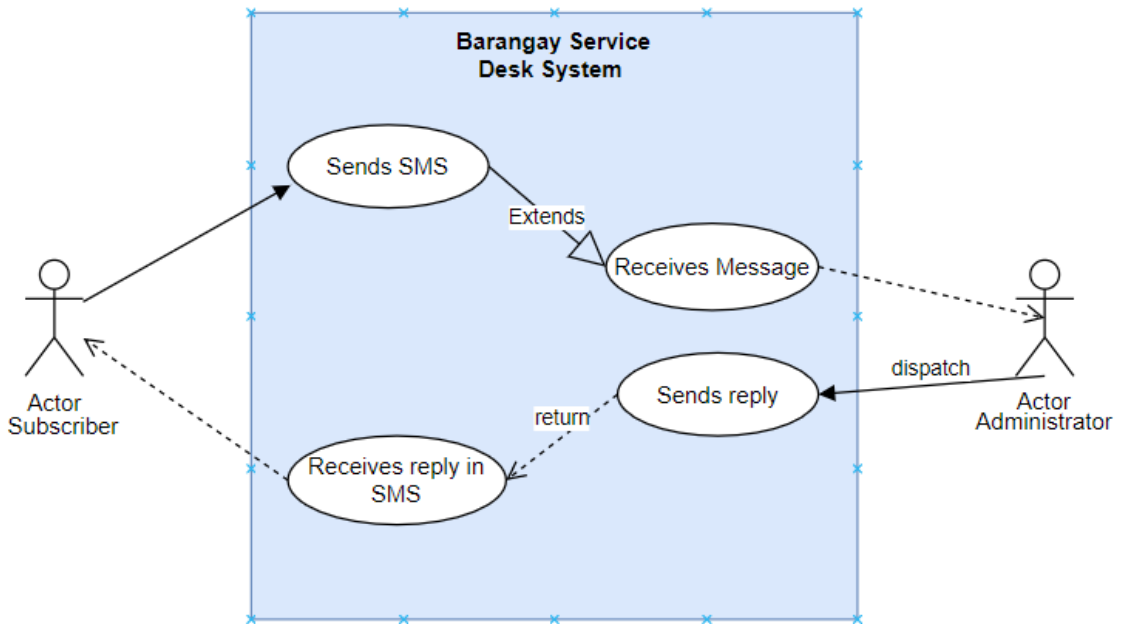


Figure 3.2. Use case scenario for the exchange of messages between subscriber and the site administrator.

The system also allows the subscribers to send preset messages, and the application would be able to send preset messages according to the keywords received from the SMS of the subscriber. The preset messages are currently configured on the backend site, but the keywords and the corresponding message to be sent are visible on the web console.

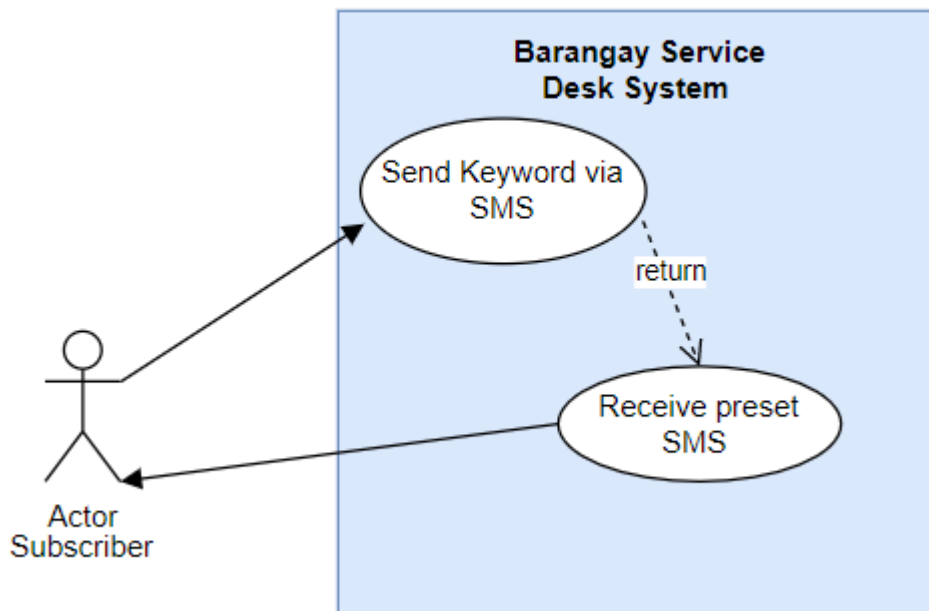


Figure 3.3. Use case scenario for sending and receiving SMS from keyword

B. Theoretical Framework

There are available technologies that are in option for this setup. For this scenario, the researcher would like to have a no to low system maintenance, so the implementation would be deployed on cloud, which is openly accessible using a web browser using a desktop, laptop, or mobile device, if internet connection is available. To ensure authenticity, only allowed users can administer the website using the user interface and the backend. Future researchers can improve the system by having another layer of administration that could be performed on the client level to reduce the interaction accessing the backend.

To store the data such as users, subscribers, and the messages, relational database management system would be used. Security would also be in place so that sensitive information would not be compromised. The database is also be deployed in cloud.

Even in the digital age, SMS remain as a good communication option. Therefore, the researcher decided to use an API available for SMS integration on the website. The API is also deployed in the cloud as part of the backend design of the system. The messages from SMS would be parsed by the API to be translated and be stored in the database and be available in the system. The API is also used by the web application to parse the message sent over the system to SMS format that would be received by the mobile phones.

The researcher came up with this theory for zero to low maintenance of the system. The system user interface would be designed as friendly as possible so that it could be used by non-technical persons with ease. Also, by widening the reach of the audience that will receive the message, SMS is an option for the setup. Having an internet connection or mobile data is quite essential but not always available. SMS uses lower bands of signals being broadcasted than the mobile data and everybody has a handheld device available, as having a cellphone is a necessity, with basic functionalities such as calls and texts. Keywords are also used to provide generic replies to usual requests and inquiries. An API is also available for integration so that we could lessen hardware maintenance for modules used such as microcomputers and peripheral modules.

C. Technologies Used

The system is composed of three parts, in which the parts have specific technologies considered in the completion of the system:

Front end: HTML, CSS, Javascript

Back End: PHP, MySQL, GlobeLabs API

Server: AWS EC2 t2 micro-Instance, running on Linux

Other technologies considered are putty, which is a SSH client that is used to access the AWS instance on cloud, and FileZilla, an open-source FTP application, which is used to deploy the required files from the local machine to the cloud instance.

D. System Design

a. System Features

The following system features below are listed and grouped according to their functionalities:

- **Subscription**
 - UC-SMS01: Subscription to System
 - UC-SMS02: Unsubscribe to System

- **Messaging**
 - **Send Message**
 - UC-SMS04: Send Custom Text
 - UC-SMS05: Send Preset Inquiry

- UC-SA01: Send Message to Single Recipient
 - UC-SA02: Send Message to Multiple Recipients
 - UC-SA03: Send Response from Preset Messages
- **Receive Message**
 - UC-SMS03: Receive System Response
 - UC-SA04: Receive Message from Subscriber
- **Site Administration**
 - UC-SA05: System Login
 - UC-SA06: View Preset Messages and Responses

b. Database Design

The database is deployed on a cloud basis and is managed remotely via phpMyAdmin connected to the database of the web system. And the database is currently consisted of 4 tables that performs different tasks according to its functionalities in the application.

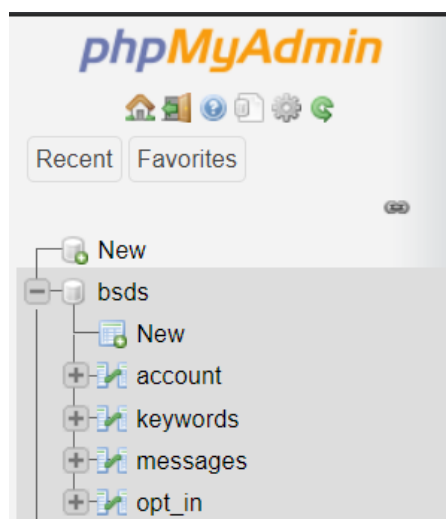


Figure 3.4. Database and table compositions

The account table is created to handle the credentials used for the login page of the system.

| # | Name | Type | Collation | Attributes | Null | Default | Comments | Extra |
|---|----------|-------------|-------------------|------------|------|---------|----------|----------------|
| 1 | id | int(2) | | | No | None | | AUTO_INCREMENT |
| 2 | username | varchar(20) | latin1_swedish_ci | | No | None | | |
| 3 | password | varchar(20) | latin1_swedish_ci | | No | None | | |

Figure 3.5. Account Table Structure

The keyword table is used to stage the keywords and corresponding message. This also contains the list of keywords that can be texted by the subscriber.

| # | Name | Type | Collation | Attributes | Null | Default | Comments | Extra |
|---|----------------|--------------|-------------------|------------|------|---------|----------|----------------|
| 1 | id | int(2) | | | No | None | | AUTO_INCREMENT |
| 2 | keyword | varchar(15) | latin1_swedish_ci | | No | None | | |
| 3 | stored_message | varchar(512) | latin1_swedish_ci | | No | None | | |

Figure 3.6. Keywords Table Structure

The messages table is used to stage the data between the messages sent by the subscribers via SMS, and, it saves the replies from the site administrator. Currently, the table is in its denormalized form, and is derived mostly in the JSON values from the API.

| # | Name | Type | Collation | Attributes | Null | Default |
|----|---------------------|--------------|-------------------|------------|------|----------------------|
| 1 | subscriberNumber | varchar(15) | latin1_swedish_ci | | No | None |
| 2 | dateTime | datetime(6) | | | Yes | current_timestamp(6) |
| 3 | destinationAddress | varchar(25) | latin1_swedish_ci | | No | None |
| 4 | messageId | varchar(75) | latin1_swedish_ci | | Yes | NULL |
| 5 | message | varchar(512) | latin1_swedish_ci | | Yes | NULL |
| 6 | resourceURL | varchar(75) | latin1_swedish_ci | | Yes | NULL |
| 7 | senderAddress | varchar(30) | latin1_swedish_ci | | No | None |
| 8 | multipartRefId | varchar(75) | latin1_swedish_ci | | Yes | NULL |
| 9 | multipartSequenceNo | varchar(75) | latin1_swedish_ci | | Yes | NULL |
| 10 | isMO | int(1) | | | No | None |

Figure 3.7. Messages table structure

The column for multipart messages is also provided. Also, the last column is **MO** determines if the message staged in this table is a **MO (Mobile Originating)**, which means the transmission is from the subscriber to the application, or **MT (Mobile Terminating)**, which means the message transmission is from application to the subscriber.

The last table is used to handle the incoming subscriptions in the system, which is populated via developed API used in Redirect URI. The access token is a unique key assigned to the subscriber number. And the column **latestIncoming** is updated and used to arrange the messages in the chat box view in the application. Once the subscriber opted out, their record is deleted in this table. And when they registered back in, a new **accessToken** is provided to them.


| # | Name | Type | Collation | Attributes | Null | Default |
|--------------------------|---|-------------|-------------------|------------|------|---------|
| <input type="checkbox"/> | 1 subscriberNumber  | varchar(15) | latin1_swedish_ci | | No | None |
| <input type="checkbox"/> | 2 accessToken | varchar(75) | latin1_swedish_ci | | No | None |
| <input type="checkbox"/> | 3 latestIncoming | datetime | | | Yes | NULL |

Figure 3.8 opt_in table structure

E. Implementation

The implementation begins in developing the front end that will serve as the view of the system itself. Design interface consideration includes simple, and user friendly from the login page up to the basic functionalities such as the inbox, compose message page, and the keyword management pages. Both views are tested in the web browsers in desktops and/or laptops, and after it is deployed on cloud, the view is also tested using web browsers on mobile phones.

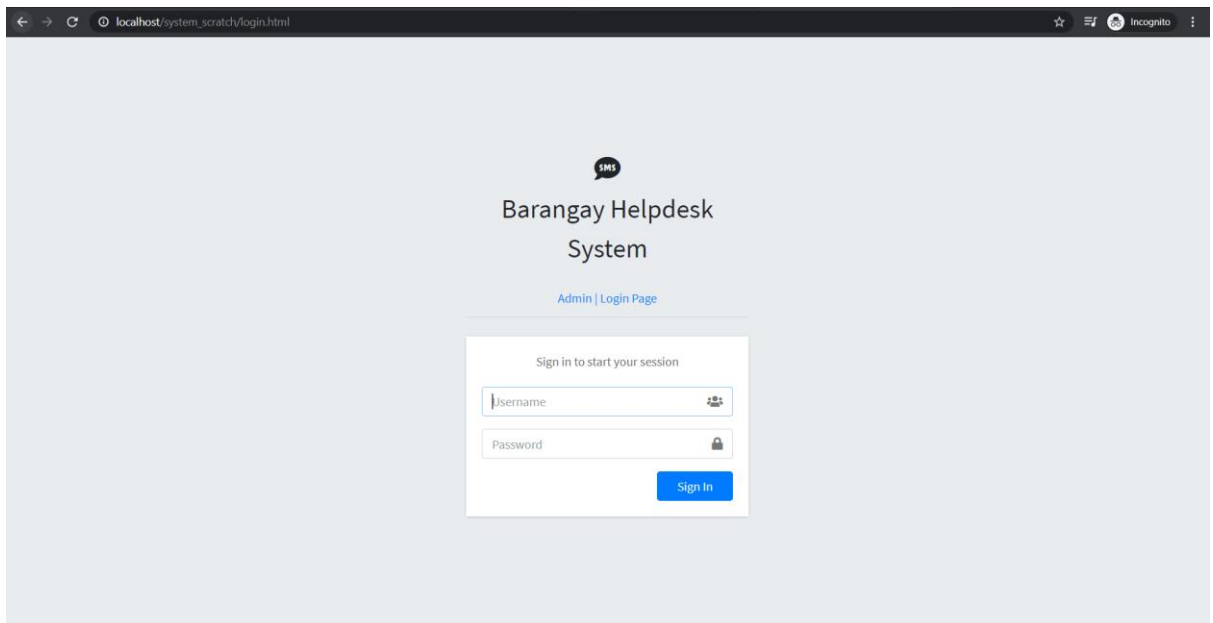


Figure 3.9. Initial design tested in local for login page

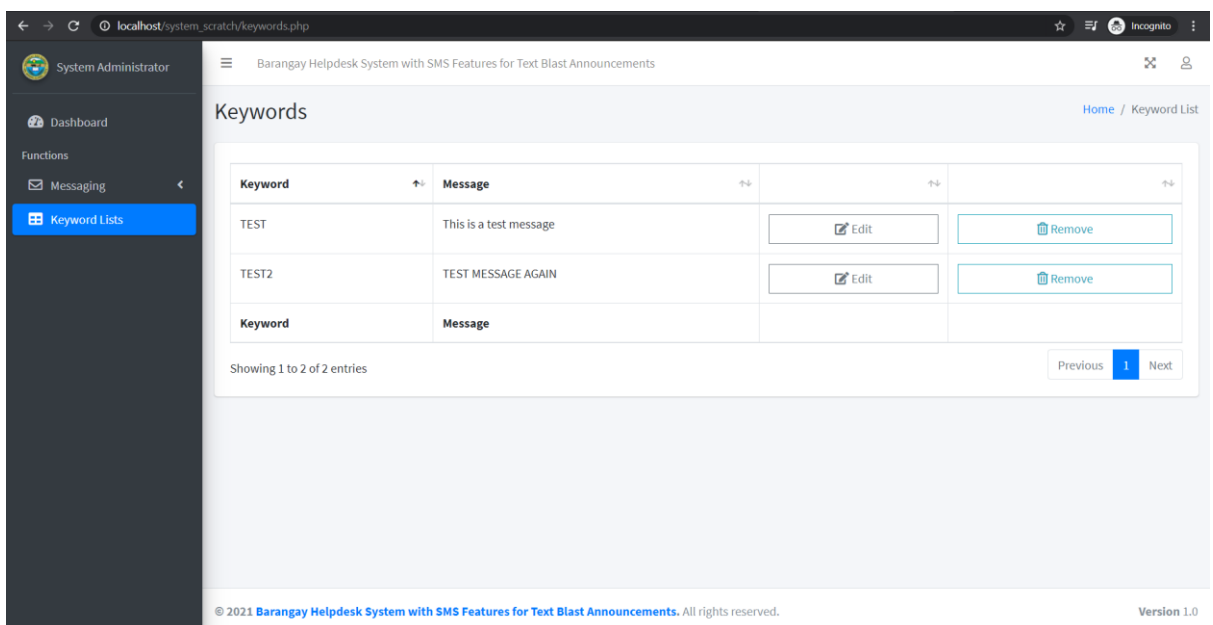


Figure 3.10. Initial design for the keyword and lists fetched in database tested in local

Next implementation is the development of the scripts that would be used for the backend for the basic functionalities such as login and logout, and the flow of the pages using PHP. Initial data population was performed on localhost using XAMPP. Database used is MySQL.

One of the implementation steps is to prepare a cloud server that would host the system. For this, a 64-bit Linux-based AWS t2 micro instance is used. This would house the web application once the setup is complete. To use the instance remotely via SSH, we have to allow SSH connection on port 22 in the security groups. We must also allow traffic also on Custom ICMP Rule on IPv4 so that we could ping our server. A key pair would be generated, and it could be used to access the server using putty. This *.pem file can be converted to a *.ppk file and can be used also as a key to access your sever via SSH using Putty.

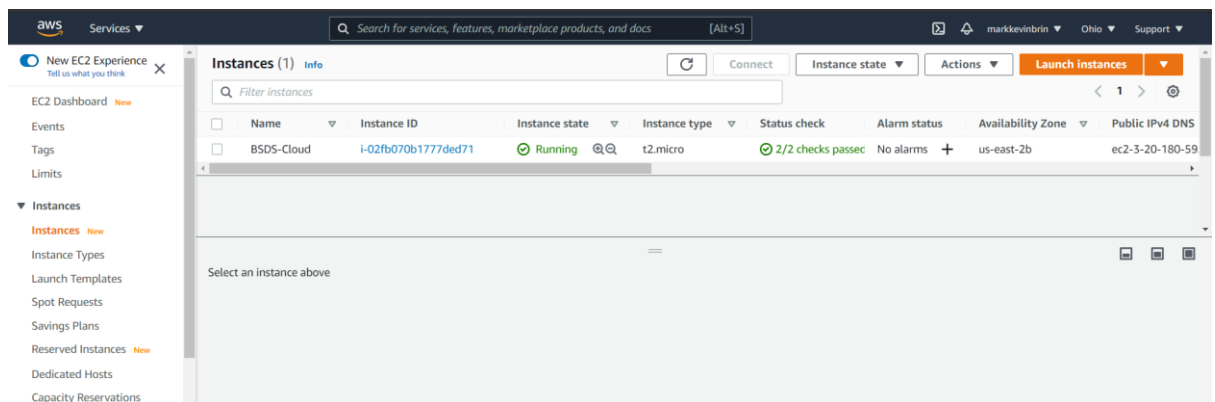
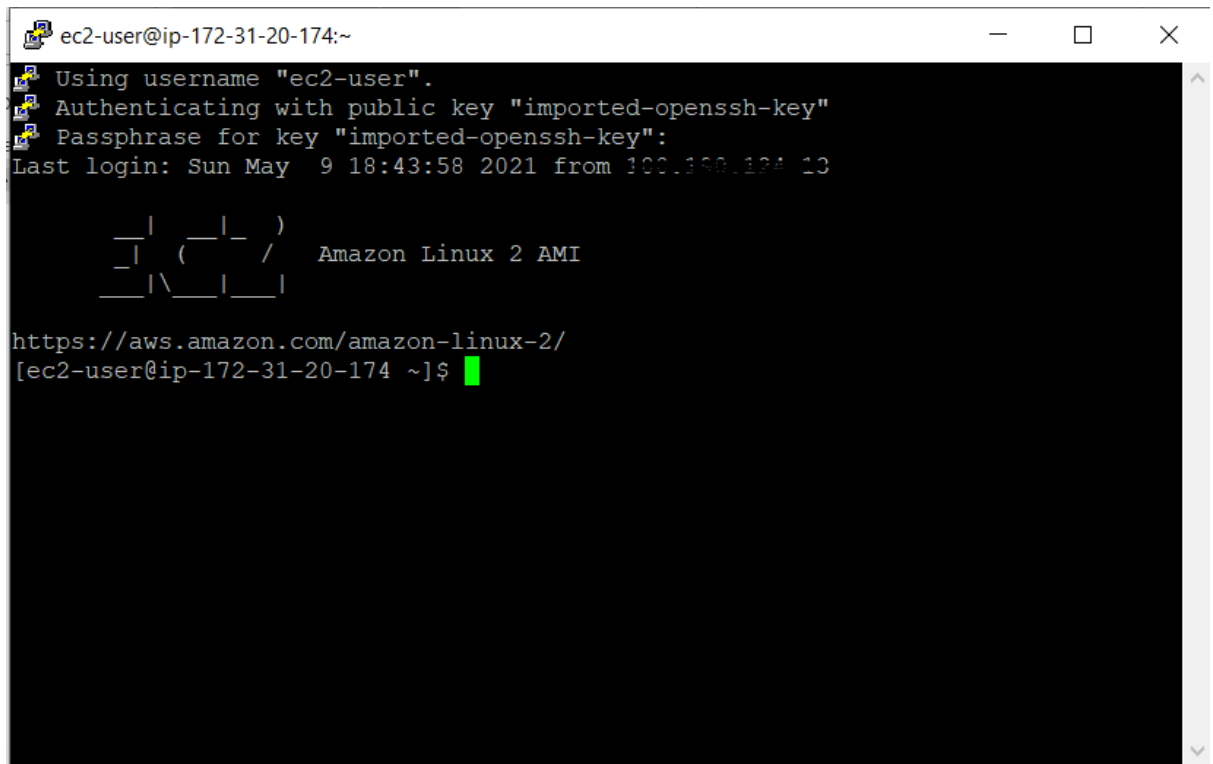


Figure 3.11. AWS EC2 Instance Dashboard

Once everything is in place, we must assign an Elastic IP for this instance. After assigning an Elastic IP for you instance, you can now access your AWS EC2 instance via SSH using the key pair assigned.



```
ec2-user@ip-172-31-20-174:~  
Using username "ec2-user".  
Authenticating with public key "imported-openssh-key"  
Passphrase for key "imported-openssh-key":  
Last login: Sun May  9 18:43:58 2021 from 100.100.100.10  
  
  _ |   _ |   )  
  _ | ( _ |   /   Amazon Linux 2 AMI  
  _ | \ _ |   |  
  
https://aws.amazon.com/amazon-linux-2/  
[ec2-user@ip-172-31-20-174 ~]$ █
```

Figure 3.12. Accessing EC2 via SSH using Putty

After setting up the basics for the cloud server, a LAMP stack is implemented for it to function as a web server. Since Linux is already completed, we have to install Apache, PHP, and MySQL or MariaDB as part of the implementation. The phpMyAdmin console is also installed for remote management of the database via web browser. After installation verification, we can now proceed with domain name assignment and securing the web server with SSL. A domain name was provided by NameCheap.com and was associated to the Elastic IP of the AWS instance. After the domain name assignment and securing it with SSL, we could test the connectivity and proceed with the migration of the data from local to cloud by SFTP using FileZilla and pointing the destination to the /var/www/html directory of the AWS instance.

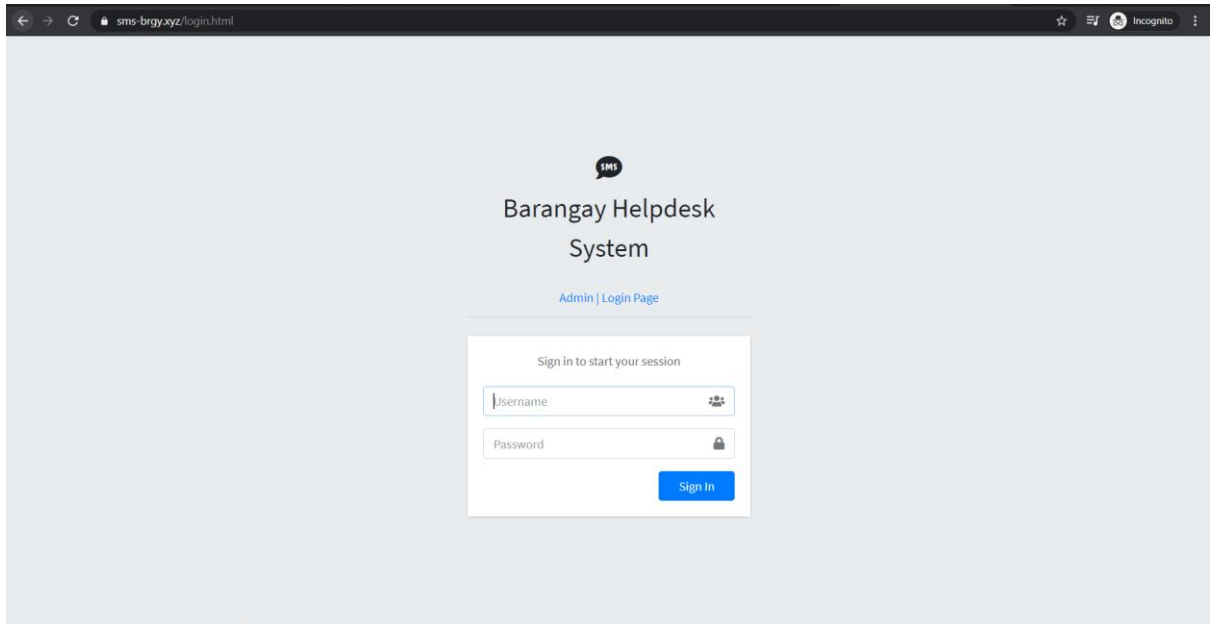


Figure 3.13. Web Application testing after migrating local file via SFTP using FileZilla. SSL is also used for added security,

Since we would be using an API from Globe Labs, we need to register first on their website for an account to be associated with your web application.

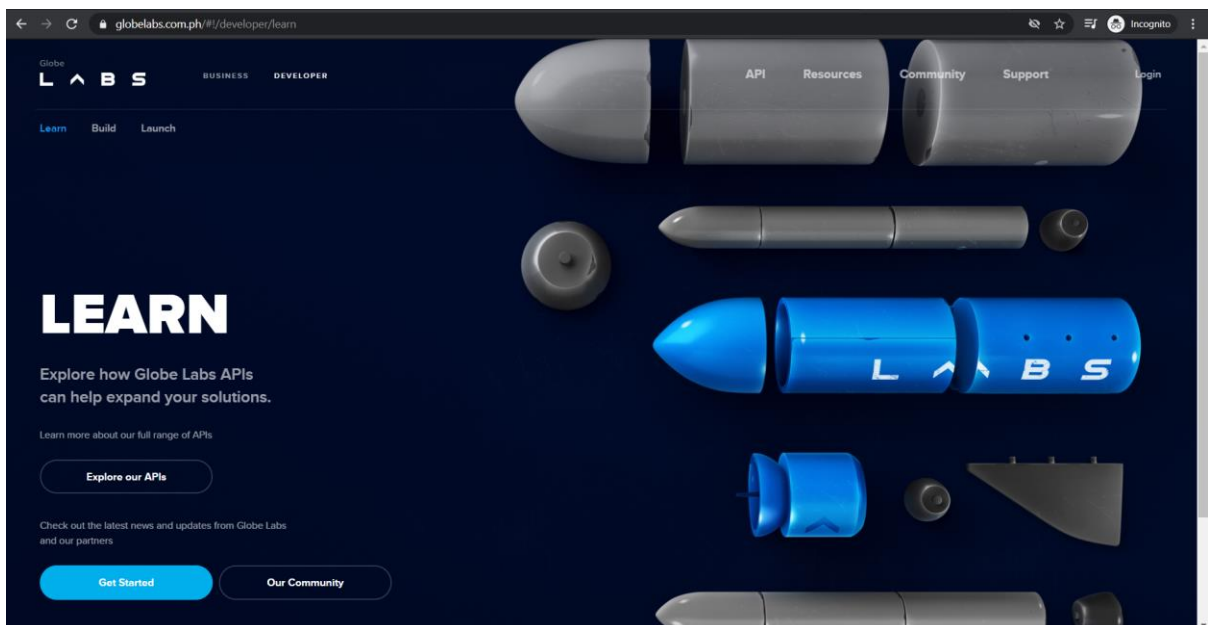


Figure 3.14. GlobeLabs API website. <https://www.globelabs.com.ph/#!/developer/learn>

You can access the website and create a developer account. After account creation and application creation, details that could associate the connection would be provided, and be used in the integration of the application and API.

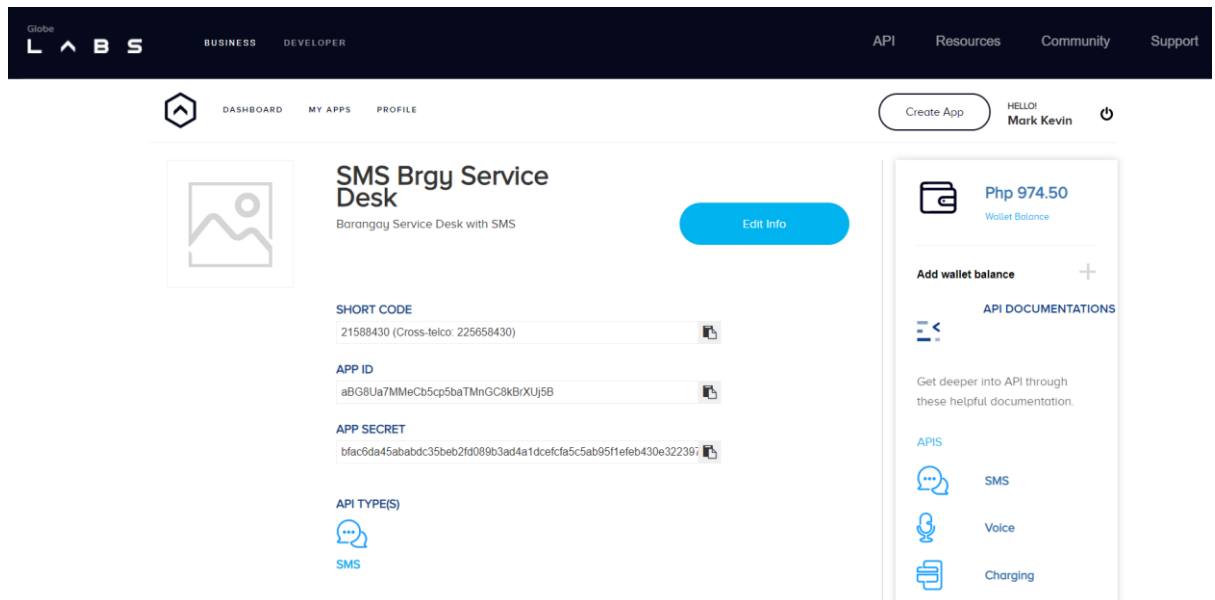


Figure 3.15. *GlobeLabs Application Dashboard View*

A short code is provided and this would be used to interact with the system via SMS. Note that you have to develop an API that could convert the JSON data from the API to your application. For this instance, a separate entry would be required for Redirect and Notify URI. These URI are responsible for the interaction and data conversion and manipulation of the GlobeLabs API to your system.

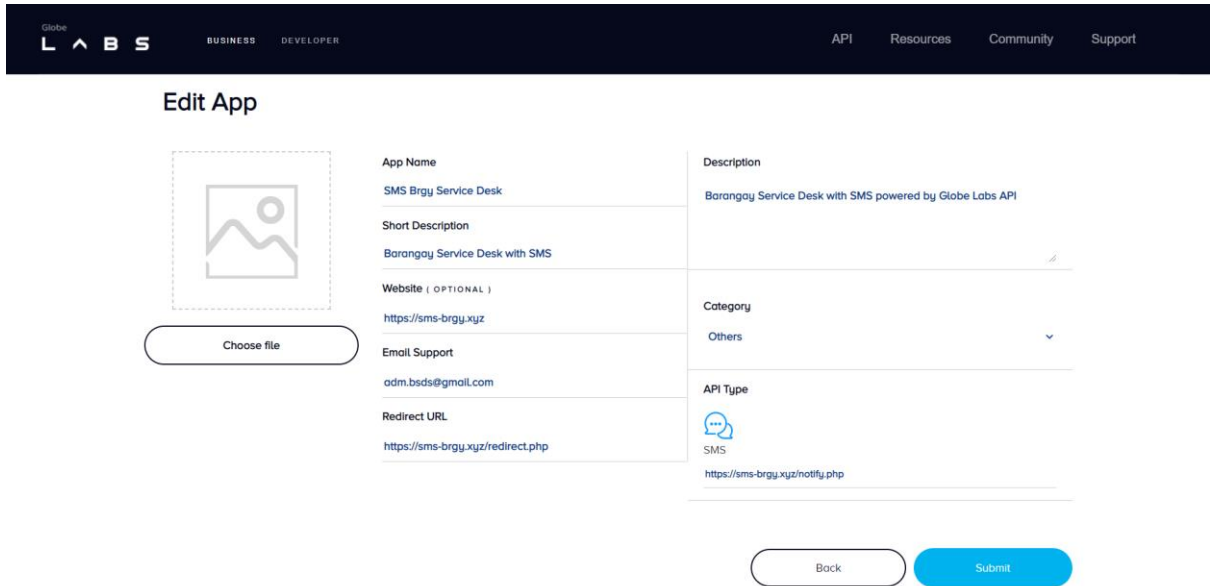


Figure 3.16. *GlobeLabs Application Information view*

Specific instructions are given once the integration is complete. This would be visible after texting the short code available. Preset messages and responses are already available in the initial integration such as how to subscribe in the system by texting INFO. And replying YES if you want to subscribe. You can also initially text HELP for other details once you are already connected. And finally, if you want to unsubscribe, you can message STOP to opt-out in the system.

Chapter IV

PROJECT ASSESSMENT

A. User Testing

Manual testing was initially performed for the functionalities. Individually, from design to backend, manual testing has been performed to ensure that the components are working independently before they were put together in place. Manual testing begins locally, and then after the migration to cloud has been performed. Also, a regression testing was performed whenever a new functionality would be introduced to the system. This is to ensure that the individual components would not affect one's output quality when not necessary.

User testing started with one mobile device for most of the functionalities including subscription, sending, and receiving messages from the system. After it has been confirmed, at least 3 more mobile number has been introduced and same number of tests has been performed. While they are confirmed working, the last functionality, sending a group message from the application, has been tested also for the small group of subscribed phones.

Bugs are found during the testing phase using manual testing methods in regards of the basic functionalities and expected outputs. For this process, the troubleshooting involves checking from the application, including code debugging and checking the database design if it stages properly to the table. This is one of the important parts of the system, for it fetches data being displayed on the system from the database.

Below is the listed use case scenario based on system features listed:

| UC-SMS01: Subscription to System | |
|---|--|
| Summary | This is the prerequisite for the access of send and receive of messages from the system. Details are first given before the user can confirm the subscription to the system. |
| Priority | Desired |
| Use Frequency | Often |
| Direct Actors | User |
| Main Success Scenario | A text message would be received once subscription is confirmed successful |
| Alternative Scenario Extensions | - |
| Notes and Questions | Possibility of double subscription? |

| UC-SMS02: Unsubscribe to System | |
|--|---|
| Summary | This allows the subscriber to unsubscribe to the system by texting a keyword. |
| Priority | Expected |
| Use Frequency | Sometimes |
| Direct Actors | Subscribed User |
| Main Success Scenario | A text message would be received that confirms the action has been performed |
| Alternative Scenario Extensions | Manually delete the entry to the database |
| Notes and Questions | Can they subscribe again? |

| UC-SMS03: Receive System Response | |
|--|--|
| Summary | A subscribed user must receive SMS responses, depending on if it is from a preset response or actual response from the site admin. |
| Priority | Essential |
| Use Frequency | Always |
| Direct Actors | Subscribed User |
| Main Success Scenario | SMS response is received whether preset response by sending a keyword or an actual response from the administrator |
| Alternative Scenario Extensions | - |
| Notes and Questions | You will also receive a response if you wish to inquire only to the system. A confirmation message must be replied to be considered as a subscribed user |

| UC-SMS04: Send Custom Text | |
|--|---|
| Summary | If the subscribed user wishes to inquire specific queries not listed on the preset messages, or wants to raise something, they could send a text message to the system. This would be received and responded accordingly. |
| Priority | Desired |
| Use Frequency | Sometimes |
| Direct Actors | Subscribed User |
| Main Success Scenario | Message would be sent successfully, assuming that the user is subscribed to the system. This would reflect in the system that a new message has arrived |
| Alternative Scenario Extensions | - |
| Notes and Questions | What if the user is not registered, what is the message be received, as the user is not registered in the system |

| UC-SMS05: Send Preset Inquiry | |
|--|---|
| Summary | A subscribed user can send preset message that would return instructions or follow up when inquiry is sent. |
| Priority | Expected |
| Use Frequency | Sometimes |
| Direct Actors | Subscribed User |
| Main Success Scenario | A preset response would be sent to the subscriber, provided that the keyword exists in the system |
| Alternative Scenario Extensions | - |
| Notes and Questions | There are limited keywords available for those persons who wishes to inquire before subscription |

| UC-SA01: Send Message to Single Recipient | |
|--|---|
| Summary | This is the ability of the site administrator to respond to a single query from a subscribed user. The end user will receive a SMS response from this action. |
| Priority | Essential |
| Use Frequency | Often – when response is needed |
| Direct Actors | Administrator |
| Main Success Scenario | Message to be stored in the database, chat history, and SMS would be received by the target subscriber |
| Alternative Scenario Extensions | - |
| Notes and Questions | Ability to collate and send multipart SMS |

| UC-SA02: Send Message to Multiple Recipients | |
|---|---|
| Summary | This is the ability of the system to send a text blast to all registered recipients. Mainly, for announcement purposes. |
| Priority | Expected |
| Use Frequency | Sometimes – Announcement purposes |
| Direct Actors | Administrator |
| Main Success Scenario | Messages would be sent successfully and be recorded in the database, and be visible for |
| Alternative Scenario Extensions | Manually send the message individually using the web system. |
| Notes and Questions | Ability to collate and send multipart SMS |

| UC-SA03: Send Response from Preset Messages | |
|--|--|
| Summary | The system has stored messages. Once a subscriber sends a text message that satisfies the keyword, it would automatically send a response according to what is assigned to the records |
| Priority | Essential |
| Use Frequency | Often |
| Direct Actors | Administrator |
| Main Success Scenario | Preset message would be sent to the recipient according to keywords sent on the subscriber's end. |
| Alternative Scenario Extensions | - |
| Notes and Questions | Case sensitive keywords? Ability to collate and send multipart SMS |

| UC-SA04: Receive Message from Subscriber | |
|---|---|
| Summary | Message sent by subscriber must reflect on the system, and stored also in the database |
| Priority | Essential |
| Use Frequency | Always |
| Direct Actors | Administrator |
| Main Success Scenario | The system must be able to store the message, and this must be visible on the web application in the form of chat history, assigned to specific subscriber. |
| Alternative Scenario Extensions | - |
| Notes and Questions | Ability to collate multipart SMS |

| UC-SA05: System Login | |
|--|--|
| Summary | Site administrators must be able to login and logout to the system. For security purposes. |
| Priority | Essential |
| Use Frequency | Always |
| Direct Actors | Administrator |
| Main Success Scenario | Successful login and logout. |
| Alternative Scenario Extensions | Logout could also be triggered by exiting the browser. |
| Notes and Questions | Can multiple accounts be administered instead of account sharing? |

| UC-SA06: View Preset Messages and Responses | |
|--|--|
| Summary | This would allow the site administrator to view the list of keywords and confirm the correct entries and information being sent. |
| Priority | Desired – Expected |
| Use Frequency | Often |
| Direct Actors | Administrator |
| Main Success Scenario | The exact response recorded in the system must be received by subscribers when they sent the corresponding keyword. |
| Alternative Scenario Extensions | View entries in the databases and perform edits on database level |
| Notes and Questions | This could be improved in the future by dynamically adding or editing the entries in the web application level. |

B. Testing Results

The below details and notes show the testing done per functional area of the system:

| Systems Details | |
|-------------------------|--|
| Project | Barangay Helpdesk System with SMS Features for Text Blast Announcements |
| URL | https://sms-brgy.xyz |
| Alternate URL/IP | https://3.20.180.59 |
| Legends | <p>UC-SMS – Use Case for SMS subscriber</p> <p>UC-SA – Use Case for System Administrator</p> |

| | |
|------------------------------|--|
| F-01: Send Message | |
| Status | Completed |
| Functional Area(s) | Messaging |
| Use Cases | <p>UC-SMS04: Send Custom Text</p> <p>UC-SMS05: Send Preset Inquiry</p> <p>UC-SA01: Send Message to Single Recipient</p> <p>UC-SA02: Send Message to Multiple Recipients</p> <p>UC-SA03: Send Response from Preset Messages</p> |
| Description | <p>Subscribers were able to send messages, preset or customized messages, from their end, in SMS format.</p> <p>Site Administrators were able to send messages and respond to preset messages based on assigned values.</p> |
| Notes for Improvement | <p>Focused group message sending for some subscribers in a particular group for controlled group messaged sending feature.</p> |

| F-02: Receive Message | |
|------------------------------|---|
| Status | Completed but buggy |
| Functional Area(s) | Messaging |
| Use Cases | UC-SMS03: Receive System Response UC-SA04: Receive Message from Subscriber |
| Description | Both subscriber and the site administrator can receive messages from end-to-end basis. |
| Notes for Improvement | Improved receive feature by collating multipart message view from the subscriber. Currently, if the message from the subscriber is a multipart message (above 160 characters), the system would display them as 2 separate chat bubble in the system. |

| F-03: Web Based Administration | |
|---------------------------------------|---|
| Status | Completed |
| Functional Area(s) | Administration |
| Use Cases | <p>UC-SA01: Send Message to Single Recipient</p> <p>UC-SA02: Send Message to Multiple Recipients</p> <p>UC-SA03: Send Response from Preset Messages</p> <p>UC-SA05: System Login</p> <p>UC-SA06: View Preset Messages and Responses</p> |
| Description | <p>Web application is accessible for the Site Administrator.</p> <p>Administrator can send and receive messages via the application individually and by group.</p> <p>The system responds to the preset messages being sent by the subscriber and can reply with the stored message assigned in the database.</p> |
| Notes for Improvement | <p>Full blown management of keywords via console. The web application has the view only but the edit and delete functions are not yet available and open for future improvements.</p> <p>Multiple account management and implementation for multiple access in the application</p> |

| F-04: Subscription | |
|------------------------------|---|
| Status | Completed |
| Functional Area(s) | Subscription |
| Use Cases | UC-SMS01: Subscription to System UC-SMS02: Unsubscribe to System |
| Description | Users can subscribe and unsubscribe successfully via SMS. The system can also determine if you are subscribed or not in the system. Also, the system deleted the record of the subscription upon opt-out of the subscription. The user can rejoin if they wish to. |
| Notes for Improvement | Some issues encountered are those experience with other networks not pushing through. API issue from the Globe Labs API itself. |

After the system has been tested, it is demonstrated by end users. At least 5 participants were initially selected to try out the system. After the experience in the system functionalities, they are required to answer questions regarding their experience in the system. The following questions were used:

1. *I think that I would like to use this system frequently*
2. *I found the system unnecessarily complex.*
3. *I thought the system was easy to use*

4. *I think that I would need the support of a technical person to be able to use this system*
5. *I found the various functions in the system were well integrated*
6. *I thought there was too much inconsistency in this system*
7. *I would imagine that most people would learn to use this system very quickly*
8. *I found the system very awkward to use*
9. *I felt very confident using the system*
10. *I needed to learn a lot of things before I could get going with this system*

The approach used to determine the overall system usability is the System Usability Scale. Responses are rated from 1 - 5, 1 being Strongly Disagree, and 5 being Strongly Agree. For the method to determine the score, the odd numbered questions are subtracted by 1, while the even numbered questions subtracts their value from 5. Adding up the total score, and multiplying it by 2.5.

Individual response are as below:

| | R1 | R2 | R3 | R4 | R5 |
|------------------------|-----------|-----------|-----------|-----------|-----------|
| Usability Score | 100 | 90 | 95 | 100 | 85 |

Overall usability score: **94**

Chapter V

DISCUSSIONS

The goal of Barangay Helpdesk System with SMS Features for Text Blast Announcement is to show the possibility of increasing the reach of communication and dissemination using combined web-based and SMS solution was executed. The proponent used several approaches in development and conducted interview and SWOT analysis that could be used as a basis on how the system would be developed. Problems encountered includes database design and column definitions, element tagging in web design which was discovered during manual testing with individual component. Network issues for the response time of the application also affects the testing phase in some of the network carriers. Overall, the execution of the functionality for single and multiple recipients was successful.

Maintenance Plans for the following should be considered:

SSL/TLS certbot automated renewal can be scheduled in crontab in your AWS EC2 instance. BY adding the parameter like shown below lets you automatically renew the certificate issued:

```
39 1,13 * * * root certbot renew --no-self-upgrade
```

After the parameter has been added in the crontab, restart the cron daemon

```
sudo systemctl restart crond
```

Server snapshot in AWS can be done manually. To do this, go to your instance, under Elastic Bookstore, click Snapshots.

- Choose **Create Snapshot**.
- Choose **Volume** as **Resource Type**
- Select the volume of your snapshot.
- Click **Create Snapshot**

Initially, your developer account in GlobeLabs has 1000 pesos worth of balance that can be used for sending messages for this purpose, as the current API assigned in the system is only SMS. You can perform a reload once it depletes via Bank Transfer.

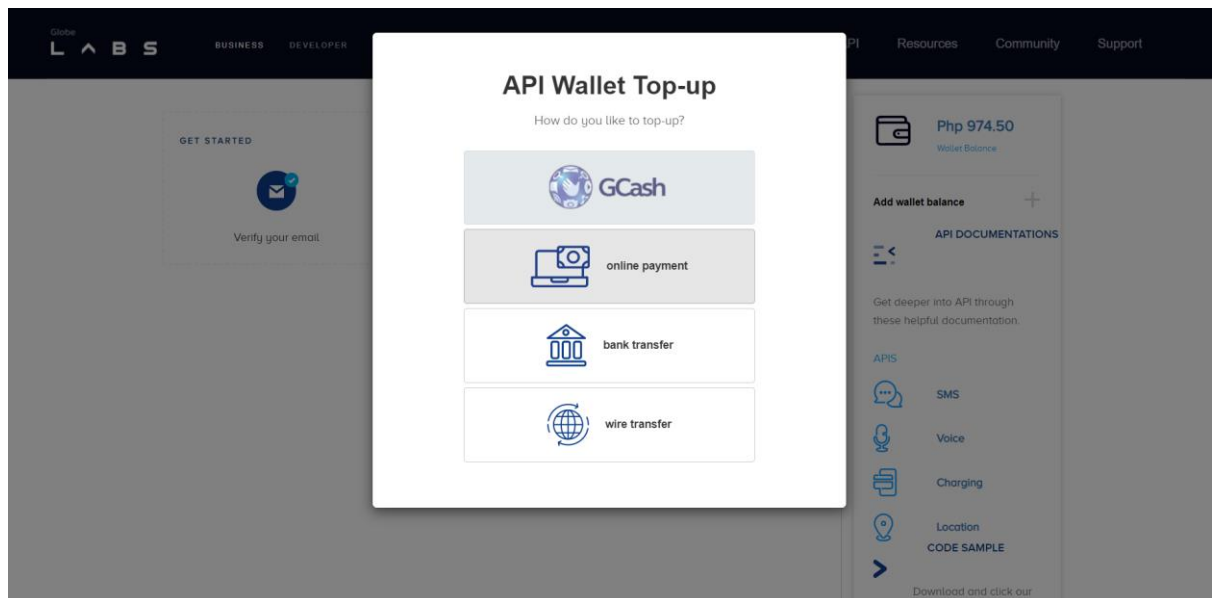


Figure 5.1. Wallet Top-up options for your system in GlobeLabs

Chapter VI

CONCLUSION

The major focus of the development of the system is to show the possibility of increasing the reach of communication and information dissemination through mixed implementation using web technologies and SMS implementation with minimal to low usage of additional hardware modules.

As the system was developed and tested through various methods of sending messages individually and in multiple values, this shows that the system can cater and address communication gaps and saves time for interaction, since subscribers can send and receive messages via SMS. Also, the short code, or the designated number by the system, can be used as a legitimate source of information for response and announcements. With some challenges such as signals and system response with mixed network issue experiences, the goal of the system is to show the possibility of combined web-based and SMS solution was executed.

Chapter VII

FUTURE WORK

The following suggestions can be integrated or incorporated for the future releases:

Full blown registration

- Includes basic details for subscribers such as name, address, and other details that may be useful in the future.

User Administration

- Multiple administrative users with different roles that can manage the site simultaneously.
- More interactive user interface for client level management and site administration such as full control of the keywords

Messaging

- Allow multipart messages from the subscriber to be collated in a single chat bubble when showing in conversation in the system.
- Focused group sending on selected or target audience only.

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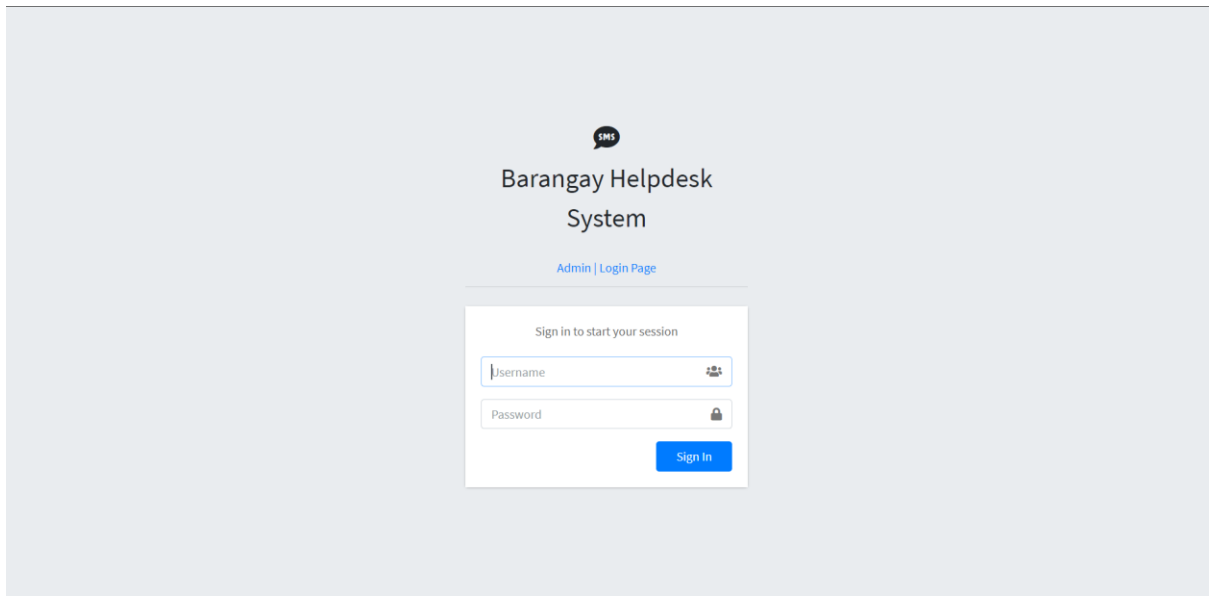
Globe Labs API Documentation, Retrieved December 2020, From <https://www.globelabs.com.ph/docs/#sms>

APPENDIX A

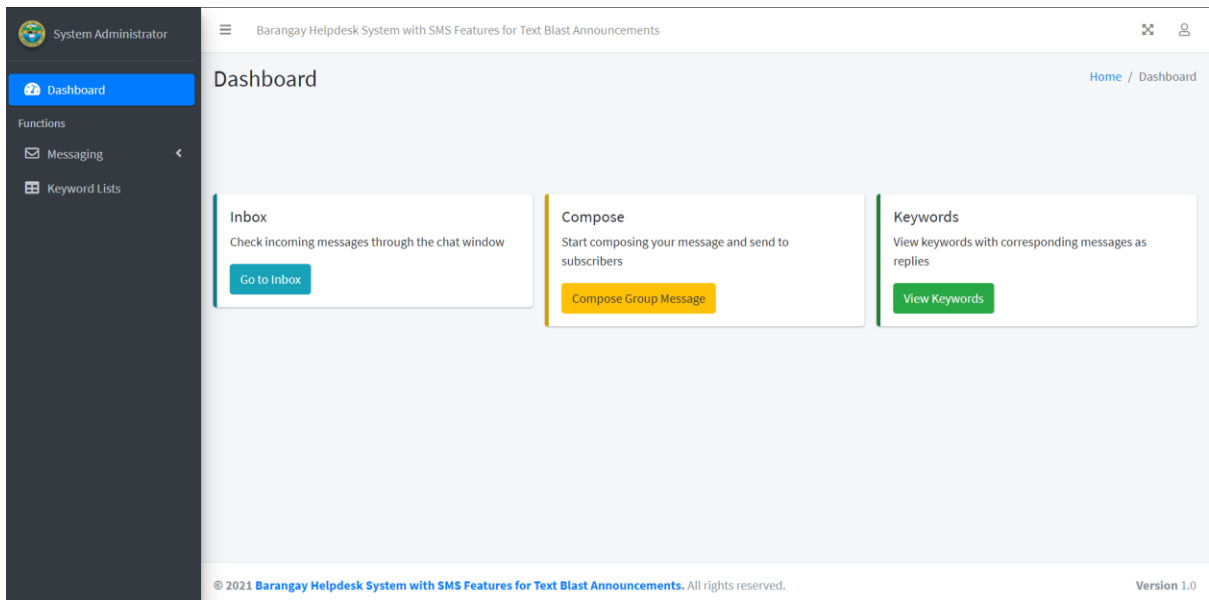
Deliverables and Milestones

Faculty of Information and Communication Studies
U.P. OPEN UNIVERSITY
Los Baños, Laguna
Philippines

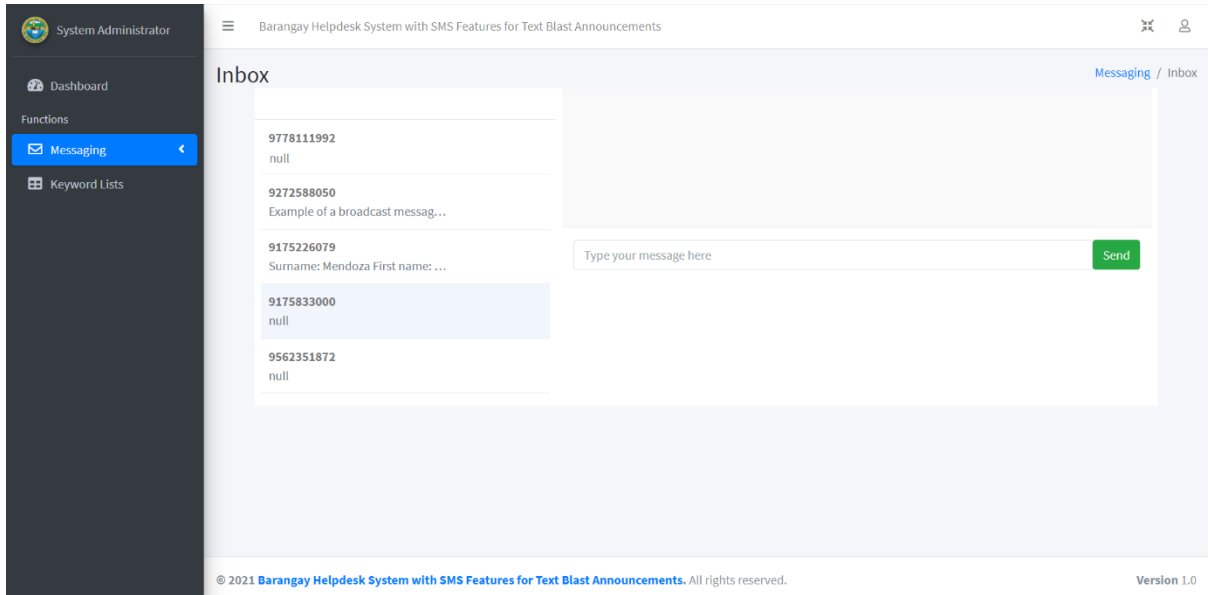
UI Prototype:



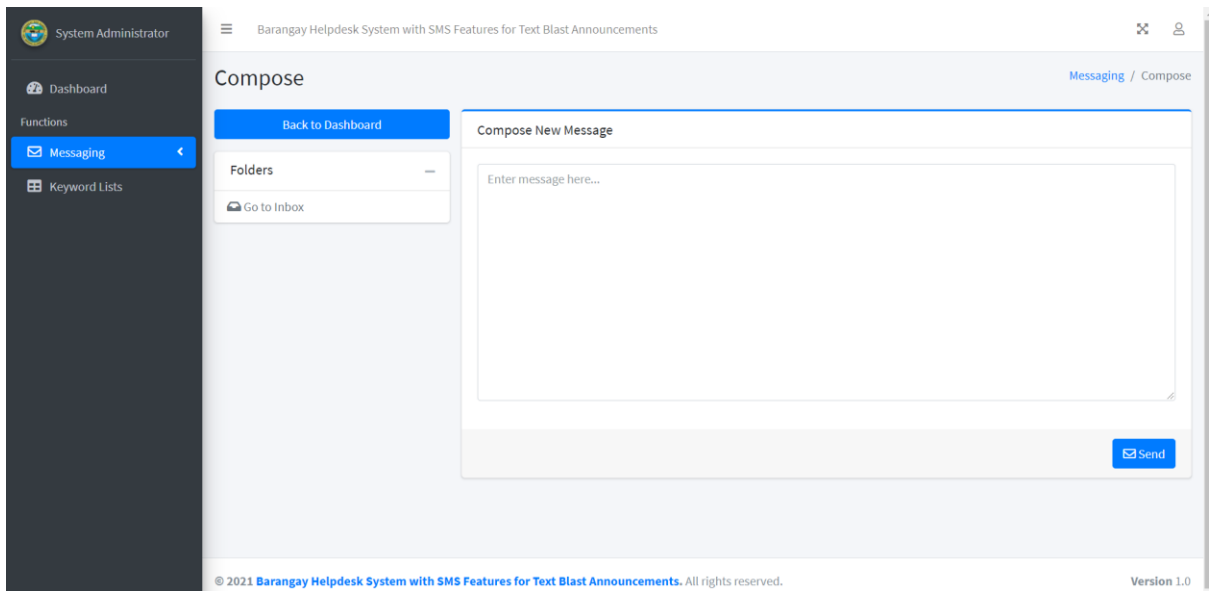
Login Page



Index - Dashboard



Messaging – Inbox



Messaging – Compose Group Message

System Administrator | Barangay Helpdesk System with SMS Features for Text Blast Announcements

Home / Keyword List

Keywords

| Keyword | Message | Edit | Remove |
|---------------|---|------|--------|
| BRGYID | Maari lamang na ibigay ang sumusunod na impormasyon: Buong Pangalan: Address: Birthday: Civil Status: SSS Number: Hintayin ang confirmation matapos ipadala ang mga detalye. Maraming salamat po TIN Number: Philhealth Number: Civil Status: Contact Person in case of Emergency and Contact Number | Edit | Remove |
| BRGYINFO | Maaring i-text ang mga sumusunod na salita upang mabigyang impormasyon ang mga kailangan: CERTIFICATION - Para sa mga mga may kailangan sa certification BRGYID - Para sa impormasyon para makakuha ng Brgy ID CEDULA - Para sa mga impormasyon kailangan para kumuha ng cedula Kung hindi makita sa listahan, maari lamang itext ang barangay sa number na ito: 21588430 | Edit | Remove |
| CEDULA | Para sa Cedula, ibigay lamang ang mga sumusunod na impormasyon: Surname: First name: Middle name: Address: Monthly Income (for work): Sex: Birthplace: Citizenship: Height: Weight: Civil Status | Edit | Remove |
| CERTIFICATION | Ibigay lamang ang mga sumusunod na detalye: Pangalan: Address: Age: Civil Status: Purpose: Hintayin ang confirmation matapos ipadala ang mga detalye. Maraming salamat po | Edit | Remove |
| TEST | This is a sample text message | Edit | Remove |
| Keyword | Message | | |

Showing 1 to 5 of 5 entries

Previous 1 Next

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Keywords

APPENDIX B

Resources

Faculty of Information and Communication Studies
U.P. OPEN UNIVERSITY
Los Baños, Laguna
Philippines

Github repository: <https://github.com/markkevinbrin/bsds>

The screenshot shows the GitHub interface for the repository 'markkevinbrin/bsds'. The repository is currently on the 'main' branch, which has 1 branch and 0 tags. The repository was last committed 2 hours ago with commit hash 8174d3c. The file list includes:

| File Name | Commit Type | Time Ago |
|--------------------------|----------------|-------------|
| AdminLTE-master | initial commit | 2 hours ago |
| Globe | initial commit | 2 hours ago |
| build | initial commit | 2 hours ago |
| dist | initial commit | 2 hours ago |
| docs | initial commit | 2 hours ago |
| pages | initial commit | 2 hours ago |
| plugins | initial commit | 2 hours ago |
| .babelrc.js | initial commit | 2 hours ago |
| .browserlistrc | initial commit | 2 hours ago |
| .bundlewatch.config.json | initial commit | 2 hours ago |
| .editorconfig | initial commit | 2 hours ago |
| .eslintignore | initial commit | 2 hours ago |

The right sidebar contains the following sections:

- About**: IS295B Code Repository, README, MIT License.
- Releases**: No releases published, [Create a new release](#).
- Packages**: No packages published, [Publish your first package](#).