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1.0 Introduction

1.1 Problem statement

In this digital age, communication between individuals has been reduced in real life but increased on the internet. Individuals nowadays would rather share their lives or express opinions on forums than in real life. It is because typing words on the phone is much easier than hanging out with friends. Moreover, content that is posted online will be exposed to more people, which can attract more people to discuss a topic, and the author can view more opinions from different perspectives. Hence, the forum application will be a need for modern people to share their thoughts and discuss specific topics with other people all around the world.

1.2 Objective

Due to the problem above, Bluedit is introduced as a forum application that allows the user to view and create posts to discuss various topics. The user can comment under the post to discuss the post or they can either like or dislike the post or comment to express their opinion. Also, the user can send the image to their post. Besides, users can customize their avatar and their description to make their profile more personalised.

2.0 Functionalities

2.1 General functionalities

2.1.1 Sign in

The user or admin must sign in through the sign in page to perform other actions. After the user or admin sign in, the account user type will be detected. Then, the user will be redirected to user to admin page based on the account user type.

2.1.2 Sign up

New users need to sign up for a new account to use Bluedit. The user must fill all 4 fields, which are username, email address, password and confirm password. The username must be between 1 to 14 characters and the password must contain at least 6 characters. The email address should follow the regular email address format. Then, the admin account for Bluedit is preset and cannot be added through sign up page.

2.1.3 Sign out

At the profile page, the admin and user can sign out of their account. When the admin or user presses the sign out button, a confirmation pop-out window will appear. The admin or user needs to press the sign out button again to sign out of their account. This confirmation window is to prevent the admin or user from accidentally sign out of their account.

2.1.4 View profile

Both admin and user can see their profile to view their username, about me and the date of joining Bluedit. The user can edit their profile information at the profile page, but the admin can only view their profile information.

2.2 User functionalities

2.2.1 Edit profile

The user can edit their profile information such as username, about me, email address, password and subscription on the profile page. To change the username and about me, the user only needs to type the new username and about me and press the submit button. However, the user needs to input the current password to change the email address and password. Then, if the user successfully changes the email, a verification email will be sent to the new email address. The user must click on the link to change the email address.

2.2.2 Change subscription and view subscription usage

The user can select their subscription so they can only see the topic they subscribed at the home page. Users can change the subscription anytime on the profile page by checking the checkbox. Besides, the user can press the “?” button to see the subscription usage and also the current subscription.

2.2.3 View post and comment

The user can view all the subscribed topic’s posts on the home page. The user can see the post’s author username, title, content, image, like count, dislike count and comment count. For each post, the user can choose to view, comment, like, dislike, comment, follow, or report. To view the comments of the post, the user can click the post’s blank space or the comment button. Then, the user will be redirected to the view comment page. On this page, users can view all the comments on the post. The user can view each comment’s author username, like count and dislike count. Besides, the user can like, dislike and report the comment.

2.2.4 Create post

At the post page, the user can create a post with a topic, title, content and images. The user must fill in the topic, title and content to create a post. The images are optional, and the user can only upload up to 2 images per post.

2.2.5 Create comment on post

After the user clicks the post and views the comment, the user can post a comment under the post. When the user posts a comment, any other user that has followed the post will receive a notification.

2.2.6 Like and dislike

For each post and comment, the user can like to dislike it. Then, the like and dislike count will be updated. The like and dislike icon will also change when the user likes or dislikes the post or comment to indicate the user has already liked or disliked the post or comment.

2.2.7 Follow and notification

When the user follows a post, any other user that posts a comment under the followed post will send the user a notification inside Bluedit and to the user’s phone. The user can only receive the phone notification when they are not using Bluedit. For the notification inside the Bluedit, the user can click the notification and go to the respective post. Besides, when the user has been reported or has successfully reported a post or content, the user will also receive a notification.

2.2.8 Report

When the user thinks the post or comment's content is inappropriate, they can report the post or comment. After the user presses the report button, a pop-out window will appear. The user must choose a reason to report the post or comment and can optionally write a description to provide a more detailed reason.

2.2.9 View other user's profile

When the user presses on the avatar or the username on the post or comment, the user can view the post or comment's author profile. In the profile, the user can see other users' avatars, usernames, dates of joining Bluedit and about me.

2.3 Admin functionalities

2.3.1 Process pending report

Admin can choose either to accept or decline the report from the users. If the admin chooses to decline the report, the report will be ignored and sent to the completed report list. If the admin chooses to accept the report, the admin can choose the penalty and apply it to the reporter. The admin can remove the content, mute the reportee and ban the reportee. Also, a notification will be sent to the reporter and reported after the admin accepts the report.

2.3.2 View completed report

Admin can view all the processed reports and see whether this report is accepted or declined. This page is used to archive all the completed reports that the admin has processed.

3.0 Navigation diagram

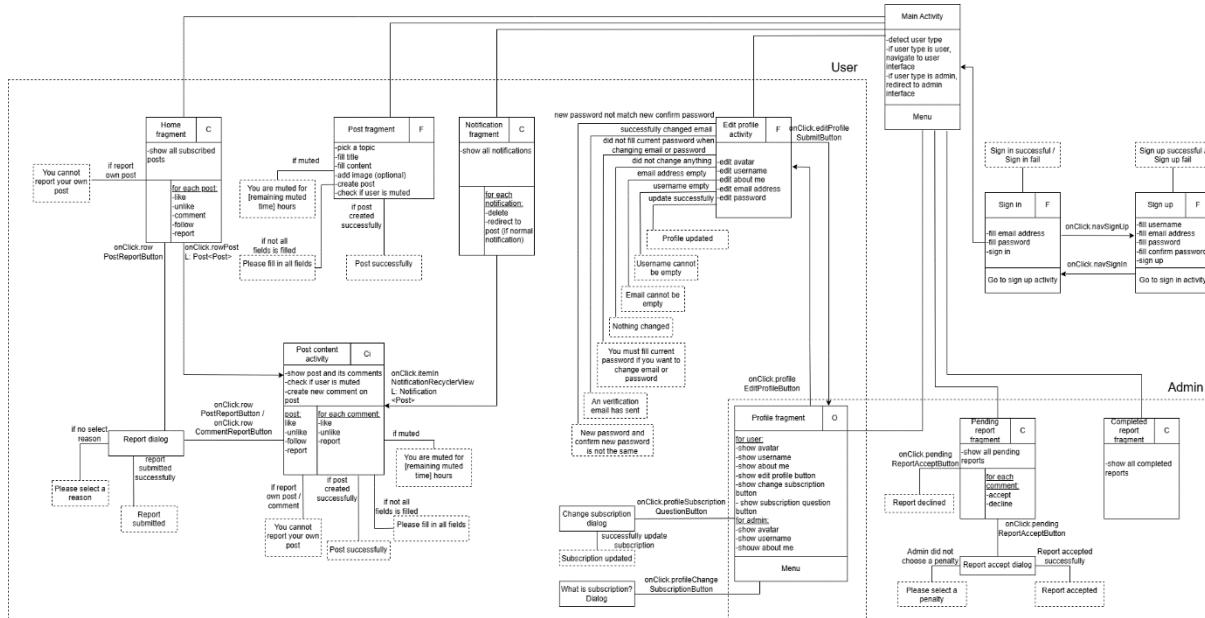
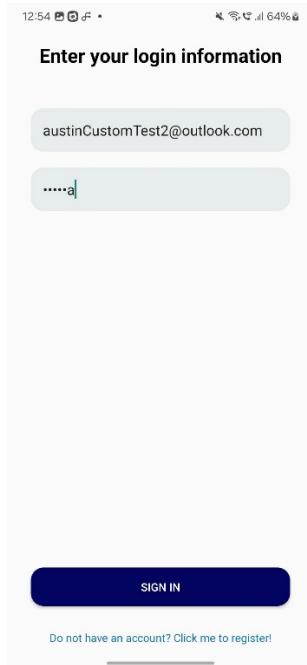


Figure 1 Navigation diagram

4.0 Wireframe/Screenshots of UI

4.1 General page

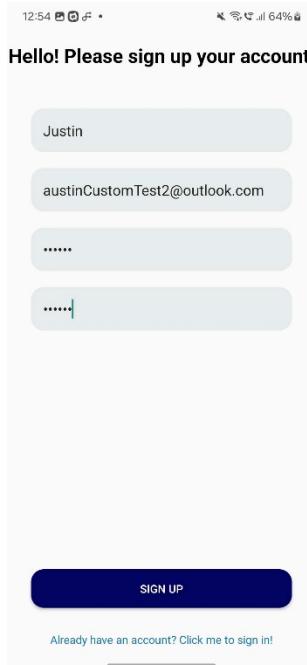
4.1.1 Sign in page



A wireframe of a mobile sign-in screen. At the top, there are status icons for signal, battery level (64%), and time (12:54). Below this is a header with the text "Enter your login information". There are two input fields: the first contains the email "austinCustomTest2@outlook.com" and the second contains the password ".....a|". At the bottom is a dark blue button labeled "SIGN IN". Below the button is a link: "Do not have an account? Click me to register!".

Figure 2 Sign in page

4.1.2 Sign up page



A wireframe of a mobile sign-up screen. At the top, there are status icons for signal, battery level (64%), and time (12:54). Below this is a header with the text "Hello! Please sign up your account!". There are four input fields: the first contains the name "Justin", the second contains the email "austinCustomTest2@outlook.com", the third contains the password ".....", and the fourth contains the password ".....|". At the bottom is a dark blue button labeled "SIGN UP". Below the button is a link: "Already have an account? Click me to sign in!".

Figure 3 Sign up page

4.1.3 Profile page

4.1.3.1 User profile page

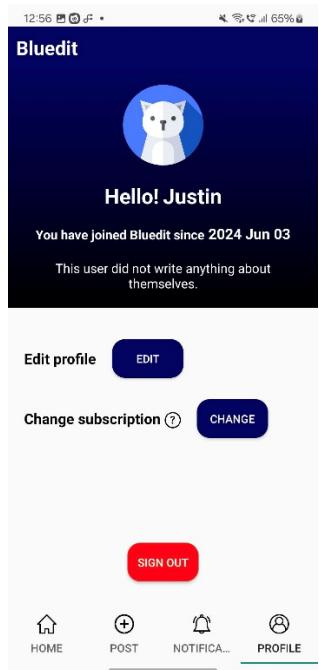


Figure 4 User profile page

4.1.3.2 Other user profile page

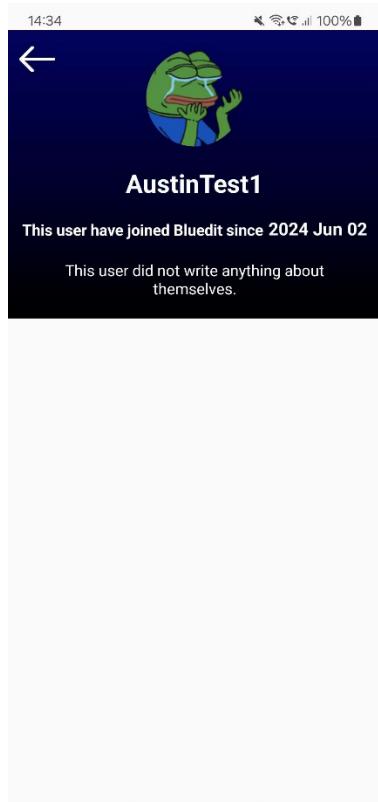


Figure 5 Other user profile page

4.1.3.3 Admin profile page

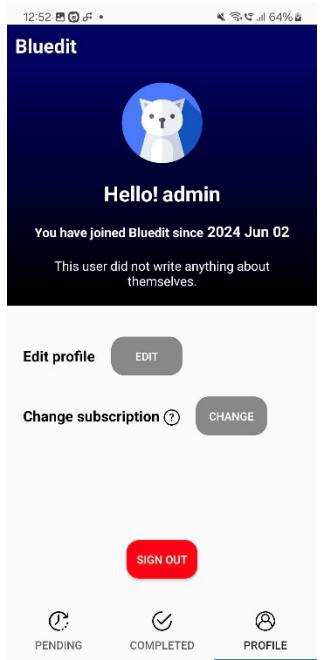


Figure 6 Admin profile page

4.1.4 Confirm sign out window

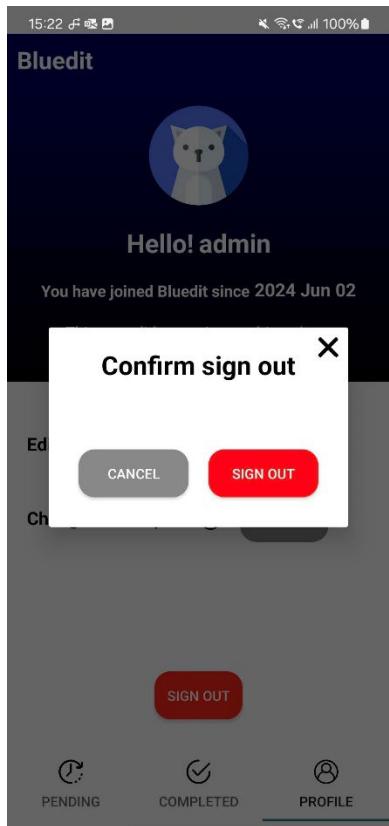


Figure 7 Confirm sign out window

4.2 User page

4.2.1 Home page

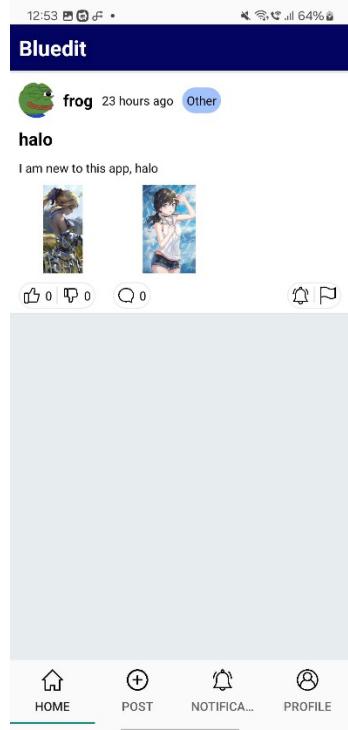


Figure 8 Home page

4.2.2 Post page

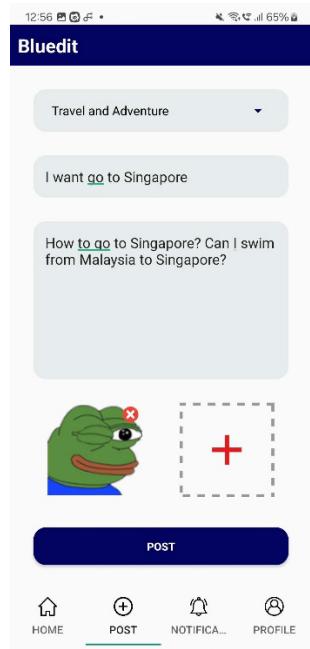


Figure 9 Post page

4.2.3 Post content page

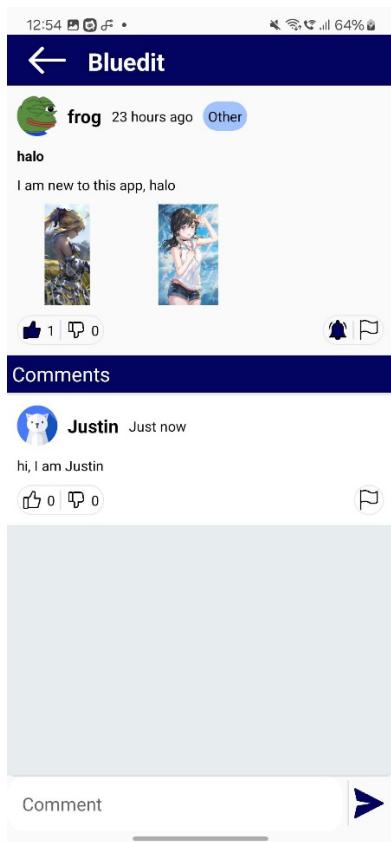


Figure 10 Post content page

4.2.4 Notification page

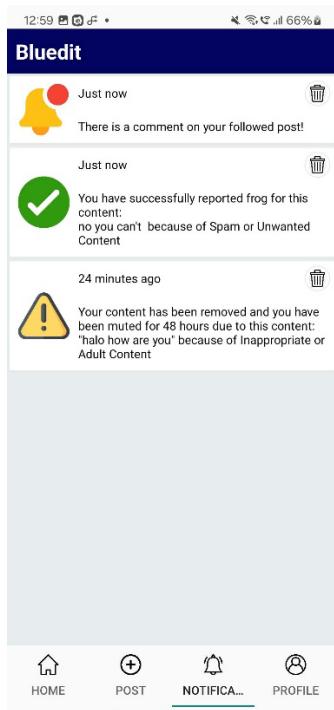


Figure 11 Notification page

4.2.5 Edit profile page

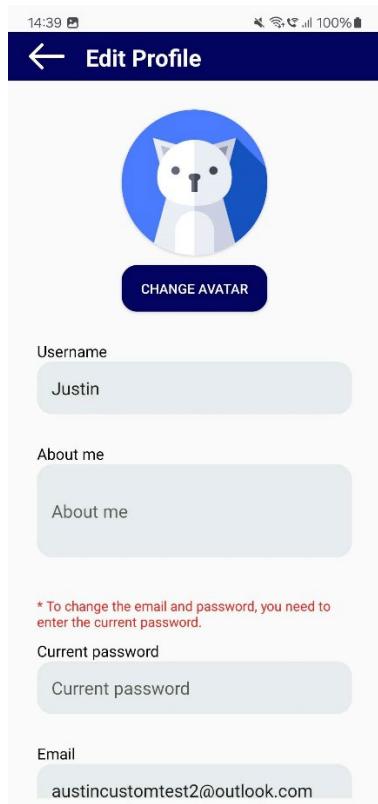


Figure 12 Edit profile page 1

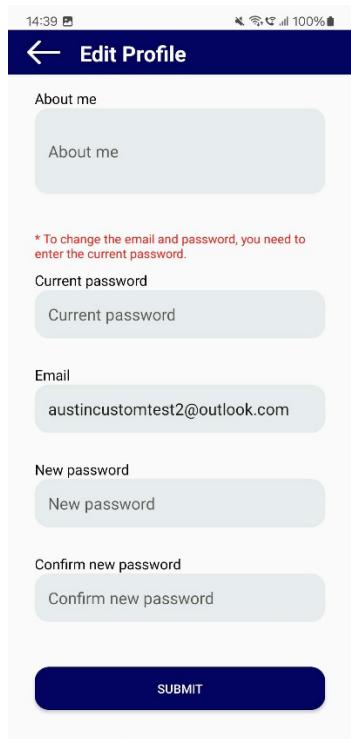


Figure 13 Edit profile page 2

4.2.6 Edit subscription window

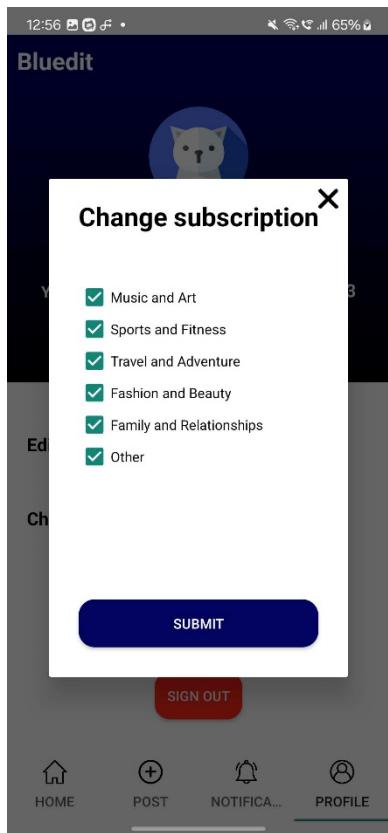


Figure 14 Change subscription window

4.2.7 What is subscription window

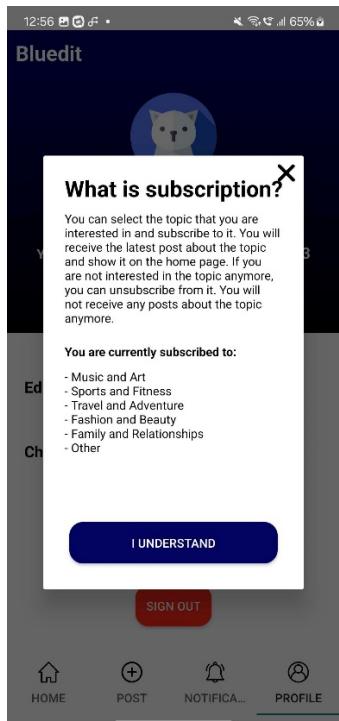


Figure 15 What is subscription window

4.2.8 Phone notification

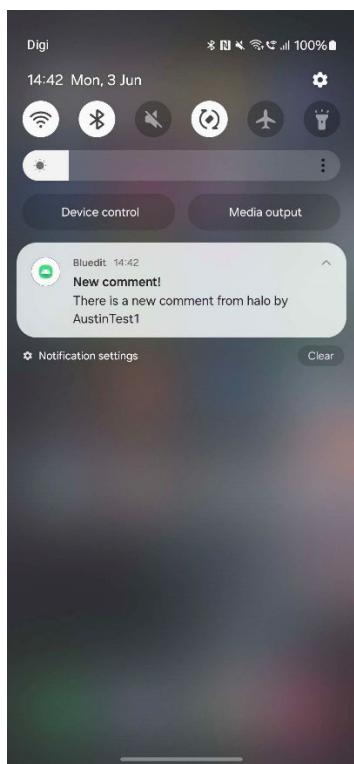


Figure 16 Normal phone notification

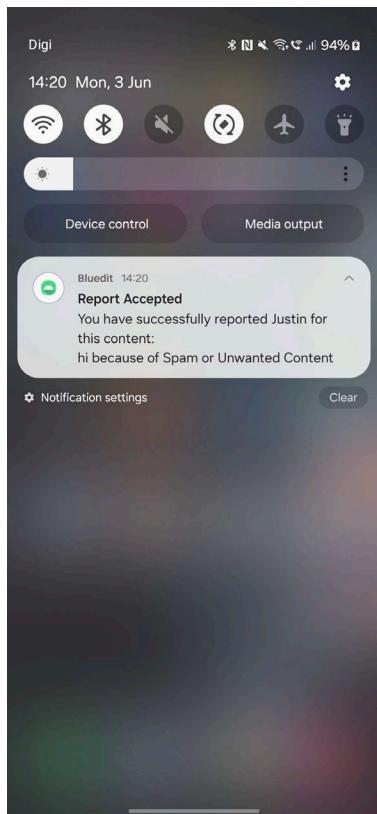


Figure 17 Report accepted phone notification

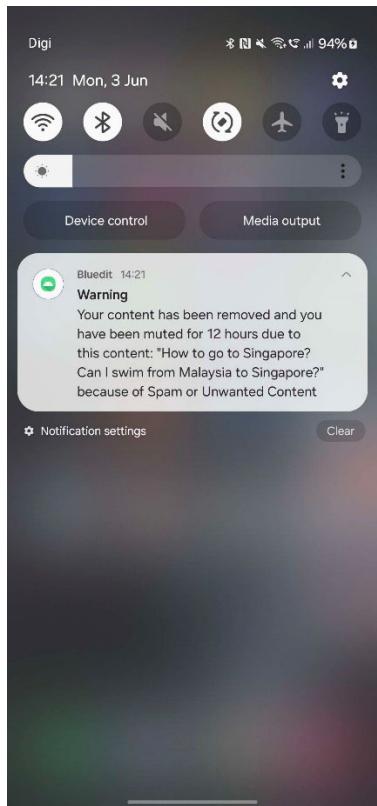


Figure 18 Warning phone notification

4.3 Admin page

4.3.1 Pending report page

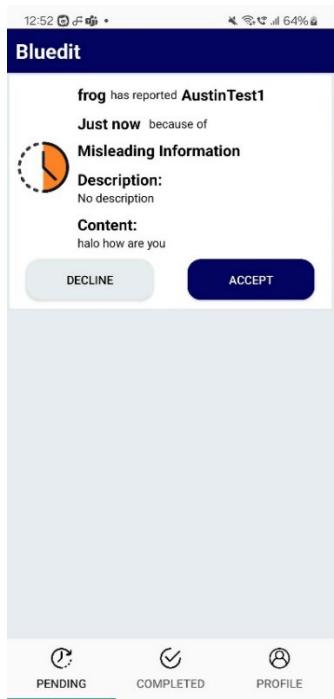


Figure 19 Pending report page

4.3.2 Apply penalty window

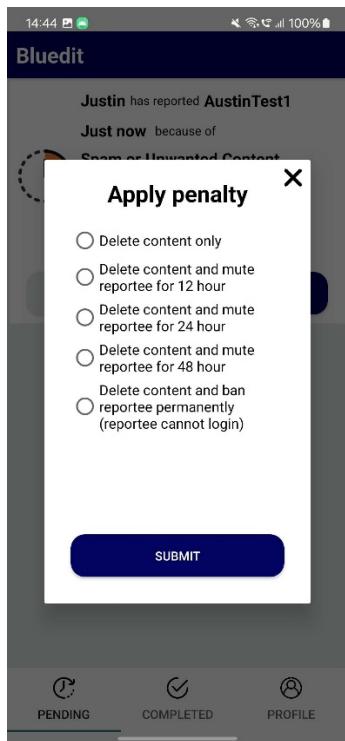


Figure 20 Apply penalty window

4.3.3 Completed report page

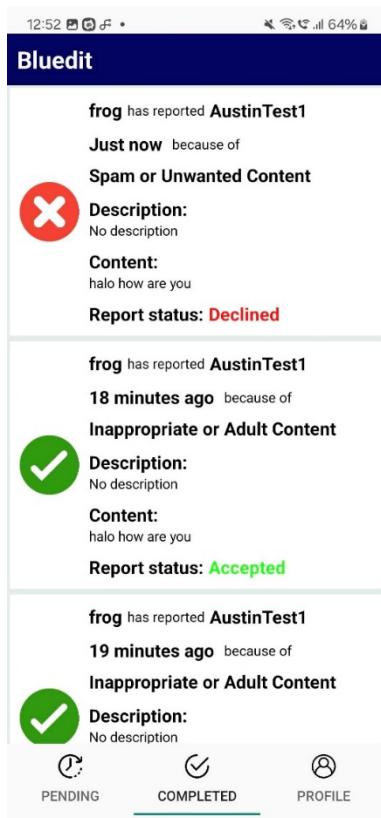


Figure 21 Completed report page

5.0 Technical description

The most complex part of the application will be the notification system. The whole application uses the notification system, including the user and admin side. For Bluedit, the notification system is achieved using the steps below.

5.1 Notification inside Bluedit

5.1.1 Create database and custom class to store notification

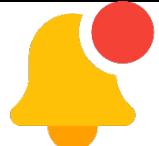
To send the notification, I need to first create a database for each user to save their notification. Hence, I can retrieve the notification in the database and show it on the notification. I defined the attributes of the notification. In the Bluedit, the notification includes the following attributes: notification ID, notification type, notification post ID, notification message and notification time. For each attribute, I have tabulated their function, which is shown below.

Notification attribute	Description and function
Notification ID	Notification ID is unique for each notification. It is used to identify each notification.
Notification type	It is used to differentiate the type of the notification. The notification has 3 types: normal notification, warning, and report accepted. The types of notifications identify which image will be used for the notification now.
Notification post ID	When the user clicks on the notification bar, which is the normal notification type, the user will be redirected to the post with the new comment. This notification post ID is used to identify which post the user should go to.
Notification message	The notification message is used to save the notification message.
Notification time	The notification time is used to save time when creating the notification.

Table 1 Notification attribute table

5.1.2 Create notification

After we can save the notification, we will need to create the notification. In Bluedit, the notification can be created by 3 methods. Each method is triggered in a different way and will create different types of notifications. I have tabulated them and shown them below.

Notification type	Trigger method	Notification image
Normal notification	Someone comment on the followed post	

Warning notification	Someone has reported the current user and has been accepted by the admin	
Report accepted notification	Current user has reported someone and accepted by the admin	

Table 2 Notification type table

5.1.2.1 Normal notification

To trigger the normal notification, I need a follow feature to identify which user is following the post. Hence, I have placed a button at the bottom right corner for each post. Then, after the user presses the follow button, the user's ID will be recorded under the following user of the post in the database. Hence, if someone has posted a comment under the post, I can know which user is following the current post, and I should send the notification to them. Besides, the notification will not be sent to the comment author if the comment author posts a comment on the post that he is currently following.

5.1.2.2 Warning notification and report accepted notification

To trigger a warning notification, I will first need the report feature. I have placed the report button at the bottom right corner of each post, and it is beside the follow button. If the user has reported a post or comment, a report will be created and sent to the pending report list on the admin side. If the admin chooses to accept the report, the reportee will receive a warning notification and the reporter will receive a report accepted notification.

5.2 Phone notification

5.2.1 Implement Firebase Cloud (FCM) Messaging in the project

For the phone notification, I used Firebase Cloud Messaging to send the notification to the user's phone. Hence, I first add the implementation of the FCM to the project. Then, I created an FCM adapter that can connect to the FCM service and send the notification to the user's phone.

5.2.2 Collect user's token

Unlike the notification inside Bluedit, the phone notification needs the user's token to identify which phone the notification should be sent to. Hence, we need to collect each user's token so we can send the notification to their phone. To collect the user's token, I will need to do the collect token feature at the place that all the users must go through when using Bluedit, which is the sign in page. At the sign in feature, I added a function that will grab the user's token and

save it to the database when the user successfully signs in to their account. Then, the user's token in the database can be used to locate the user's phone later to send the notification.

5.2.3 Send notification to user

After I collect the user's token, I can finally send the notification to the user's phone. The method of triggering the notification is the same as the notification inside Bluedit. To send the notification to the user's phone, I added a function that will send the notification to the user's phone using the FCM adapter. Then, I will call the function after the notification in Bluedit is sent. Hence, when the user using the Bluedit, they can receive the notification in the application. If the user did not using the Bluedit, they can still receive the notification at the phone and also receive the notification inside Bluedit.

6.0 Limitations, constraints

6.1 Lack of some features

Bluedit, for now, is missing some convenient features that will significantly improve the user experience, such as a sorting feature, search feature and archive feature. This feature should be included in the forum application so the user can search and save the post as they want. However, the lack of these features has lowered Bluedit's usability and competitiveness compared to other forum applications. Hence, users might be more likely to use other forum applications than Bluedit.

6.2 User interface aesthetics and customization

For most users, the user interface aesthetics for the Bluedit might not be as clean and pleasant compared to other forum applications. It causes some users who are more sensitive to the user interface to be less willing to use Bluedit. Also, Bluedit does not have features to customize the user interface, such as dark mode, font size, and font family. Some users might already used to the dark mode and the specific font size and font family. Hence, the fixed user interface might make Bluedit less attractive to them.

7.0 Future improvements

7.1 Add more features

7.1.1 Sorting feature

The Bluedit now can only show posts and comments based on the descending times. If the user wants to find the oldest post or comment, the user can only keep scrolling down until they find the oldest post or comment. Moreover, the sorting feature can also sort posts or comments based on the like count. By using this feature, the user can find high-quality posts or comments more easily.

7.1.2 Search feature

The Bluedit now do not have any search feature, which means that user is hard to find specific post. Hence, a search feature might be very convenient for the user to find the post by using the keyword or the topic. Besides, the search feature could save the user's search history. Hence, the user can find the post that they search for more easily.

7.1.3 Archive feature

The archive feature is useful for the forum application since the user might want to save a post that is very useful for them. For example, some posts might discuss a topic that the user is interested in, such as the guide to building your own desktop. Then, the post and the comments are of very high quality and provide many useful guides and suggestions that will help in building a desktop. If the user does not want to lose this post, the user can archive the post so the user can view the post anytime as the user wants.

7.2 Improving user interface aesthetics and customization

To improve the user interface now, we should ask the consultant or the professional at the user interface design aspect for their suggestions. Hence, the user interface design for Bluedit can be improved and become more pleasure. Moreover, the user interface customization should be added to Bluedit so the user can customize the Bluedit user interface based on their preference.