Project Report

Mobile and Ubiquitous Computing - 2021/22

Course: MEIC

Campus: Tagus

Group: 17

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1. Features

Describe which features stated in the project specification were implemented. Fill out the following table. For each feature, indicate its implementation state. If partially implemented, describe what was achieved.

Component	Feature	Fully / Partially / Not implemented?
Mandatory Features	Create Unique Username	Fully
	Create/Search/Join/Leave Public Chatrooms	Fully
	Create/Share/Join/Leave Private Chatrooms	Fully
	Create/Search/Join/Leave Geo-fenced Chatrooms	Fully
	Show/Hide Geo-fenced Chatrooms When Moving	No
	Messages Sync Across Devices Promptly	Fully
	History Available to All Users in Chatroom	Fully
	Posting Text Messages	Fully
	Posting Photos from Camera	Fully
	Posting Locations	Partially: only posting a hyperlink to google maps on a specified location
	Messages Indicate Author and Timestamp	Fully
	Chatrooms Indicate Unread Messages	No
	New Message Notifications	Fully
	Efficient Message Retrieval	Fully
	Download Images on Request with Cellular Data / Automatically with WiFi	No
	Data Caching	Fully
	Cache Pre-loading	No
Securing Communications	Encrypt Data in Transit	Fully
	Check Trust in Server	Fully
Meta Moderation	Message Flagging	No
	Filtering Flagged Messages	No
	User Blocking	No
User Accounts	Account Creation	Fully
	Login / Logout	Fully
	Account Data Synchronization	No
	Guest Access	No
	Private Chatroom ACL	No
Additional Media: Files	Pick File and Upload	No
	Download File and Open	No
Additional Media: Polls	Create Poll	No
	Vote / Change Vote	No
	Show Current Tally with Bar Plot	No
Social Sharing To Other Apps	Sharing Items	No
Social Sharing From Other Apps	Accepting Shared Items	No
	Posting Shared Item to Chatroom	No
Localization	Translate UI	Fully
	Translate Chats	No
UI Adaptability: Rotation	UI Works Well Vertically and Horizontally	Partially: images may take up a lot of screen space.
UI Adaptability: Light/Dark Theme	UI Works Well in Light and Dark Mode	Fully
Recommendations	Compute Most Likely Chatroom Pairings	No
	List Sorted Suggestions	No

Optimizations

You can share an app link for public chat rooms.

2. Grading Adjustments

When grading the class project we will assign a common grade to the team and then calculate individual student grades by adding or subtracting an individual adjustment factor, based on each team member's contributions as assessed during during the final project discussion. Please indicate what you consider to be fair adjustments for each team member.

Student #	Adjustment
90718	50%
90792	50%
77915	0% :(

3. Mobile Interface Design

The basic flow is demonstrated in the appended diagram.

4. Server Architecture

4.1 Data Structures Maintained by Server and Client

The server maintains a list of created users, chat rooms, and chat messages. It also maintains a dictionary to associate each connected user to a socket.

The user has an ID, a password and a set of chat rooms which they have joined. A chat room also has an ID, a list of messages and a set of joined users. A Geo-fenced chat room has an associated latitude, longitude and radius. A chat message has an author, a timestamp, a string representation of the content (text/image) and a type describing how to decode the content.

4.2 Description of Client-Server Protocols

The client communicates with the server primarily through a RESTful API. But it also establishes a connection to the server through a socket, from which it will be notified of updates. API communication uses TLS. The client stores the server certificate and verifies each response.

5. Implementation

The server was programmed in python using the Flask web framework. For the Android Https requests, we're using OkHttp3 and Moshi to convert Json to Java objects and an LruCache to cache them. Java 11 was used for convenience. Global state was shared with global static fields in a Data object. To store the username we use Shared Preferences. The socket connection is established in a Service, which sends a broadcast whenever there's a new message, and updates the global state. There's also a service to send notifications. Each Service is running on a different thread. The server has no persistent state.

6. Simplifications

The server only functions locally. Ideally we would host the server on the cloud, and also get a certificate from a trusted CA. For posting locations, we only post the hyperlink to the google maps location. Ideally we would display an embedded map with the location without relying on Google Maps. Currently the server stores and sends images as Base64 strings, which takes up more space than necessary. If we had more time, we would store and send them as bytes.

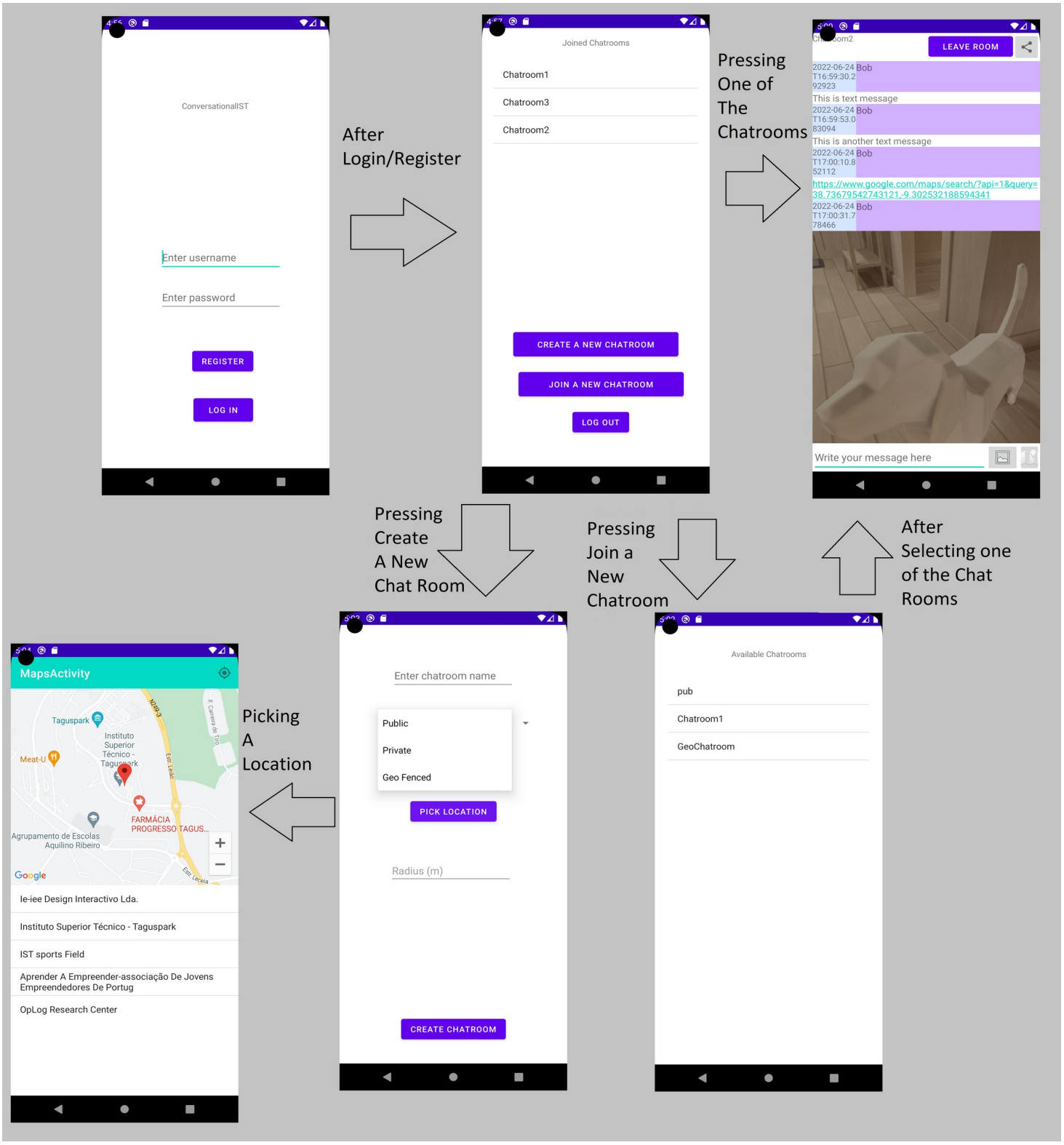
7. Bugs

Currently if you click on a notification, you may not always go to the right chat room. If a user is able to join a Geo-fenced chat room, they always have access to it. They can also join any Geo-fenced chat by clicking on an app link. Ideally we would check the user's location every time they interact with the chat room and either allow or deny access.

8. Conclusions

There were a few libraries which were deprecated, which made development harder than predicted and occupied a lot more of our time. It would be great if you could provide more examples of practical code, especially when dealing with separation of UI code and code that deals with domain logic.

Wireframe


ConversationalIST
Enter username
Enter password
REGISTER
LOG IN
After Login/Register
Joined Chatrooms
Chatroom1
Chatroom3
Chatroom2
CREATE A NEW CHATROOM
JOIN A NEW CHATROOM
LOG OUT
Pressing One of The Chatrooms
LEAVE ROOM
2022-06-24 T16:59:30.292923 Bob
This is text message
2022-06-24 T16:59:53.083094 Bob
This is another text message
2022-06-24 T17:00:10.852112 Bob
https://www.google.com/maps/search/?api=1&query=38.73679542743121,-9.302532188594341
2022-06-24 T17:00:31.778466 Bob
Write your message here
After Selecting one of the Chat Rooms
Pressing Join a New Chatroom
Available Chatrooms
pub
Chatroom1
GeoChatroom
Pressing Create A New Chat Room
Enter chatroom name
Public
Private
Geo Fenced
PICK LOCATION
Radius (m)
CREATE CHATROOM
Picking A Location
MapsActivity
Taguspark
Instituto Superior Técnico - Taguspark
Meat-U
FARMÁCIA PROGRESSO TAGUS...
Agrupamento de Escolas Aquilino Ribeiro
Google
Ie-iee Design Interactivo Lda.
Instituto Superior Técnico - Taguspark
IST sports Field
Aprender A Empreender-associação De Jovens Empreendedores De Portug
OpLog Research Center