## Group Members:

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## Student Group Chatting App - Project Report

### 1. Real-World Problem Statement

**Problem:**

College and university students often struggle to find a unified, organized platform where they can communicate with classmates, share study materials, organize events, and receive updates relevant to their courses. Existing social media and messaging apps are general-purpose and do not focus on academic collaboration, often lacking features tailored for group study, resource sharing, and course-based interaction.

**Solution:**

Our app is designed to provide a dedicated platform for students to create and join study groups based on their courses or colleges. It enables them to share resources like notes and documents, create and discover events, and access newly shared materials within the last 24 hours. Additionally, students can customize their profiles and create themed albums, making academic collaboration both effective and engaging. This focused, course-based interaction encourages productivity while providing students a supportive, interactive community.

### 2. How Our App Solves This Problem

**Course-Specific Groups:**
Students can create or join groups specifically aligned with their courses, ensuring the group interactions and shared resources are directly relevant to their studies.

**Material Sharing:**
Each group offers a centralized space for sharing documents, notes, and other academic materials. This reduces the need for external communication and helps students keep all resources in one accessible place.

**Event Creation and Album Sharing:**
Students can organize academic events, study sessions, or course-related activities. Albums help categorize shared materials, and a real-time discovery feature lets students see the latest albums and events posted within the last 24 hours.

**Customizable Profiles:**

Profile customization allows students to add a personal touch, making the app experience more engaging.

**Real-Time Chatting:**

Built-in chat functionality enables students to communicate instantly, collaborate on assignments, and seek clarifications directly from group members.

**Future Enhancements:**

Planned push notifications will keep students updated on new group messages, events, and other activities. Additionally, the AI chatbot will act as a virtual assistant to answer course-related queries, further assisting students in their studies.

**3. Technical Choices and Reasoning**

**Frontend (React Native, Redux, JavaScript):**

React Native provides cross-platform compatibility, allowing the app to run smoothly on both Android and iOS. Redux is used for efficient state management, ensuring data consistency across screens and reducing loading times for an enhanced user experience.

**Backend (Node.js, Express.js):**

Node.js and Express.js are used to set up a scalable, non-blocking server. These technologies are lightweight and handle high concurrency, making them ideal for managing multiple real-time chats, groups, and requests simultaneously.

**Messaging (Kafka and Redis):**

Kafka is implemented as a message broker to manage chat messages. It ensures reliability, reducing the risk of message loss and enabling high-throughput message processing. Redis serves as a pub/sub service and a caching layer, providing faster data access and real-time updates across the app.

**Databases (MongoDB, PostgreSQL, and Amazon S3):**

MongoDB: Used for storing chat messages, allowing schema flexibility and scalability to handle large volumes of messages efficiently.

PostgreSQL: Used for storing static data like user profiles and group information. PostgreSQL's relational structure ensures consistency and reliability for structured data.

Amazon S3: Media files (e.g., images, documents) are stored in S3, offering secure and scalable storage. This setup provides high availability for media files and keeps the app lightweight.

## 4. Challenges and Errors Encountered

**Latency in Real-Time Chatting:**

During initial testing, some latency issues were observed in real-time chat updates. We optimized Redis for caching group and chat data to address this, reducing the time required to fetch frequently accessed information.

**Media Upload Timeouts:**

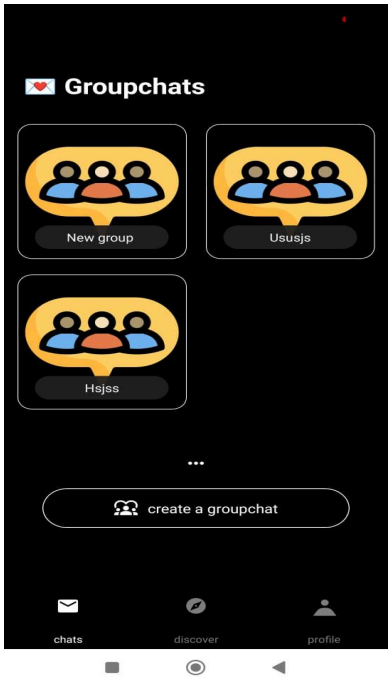
Uploading large media files caused timeouts, leading to incomplete uploads. To resolve this, we implemented Amazon S3 with optimized connection settings, enabling efficient and reliable media file storage.

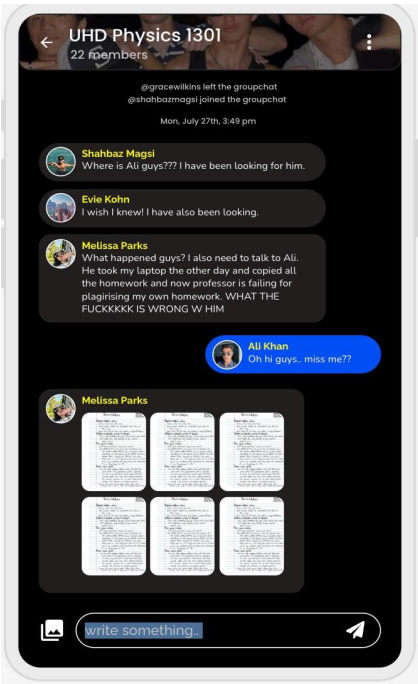
**Memory Management for Caching in Redis:**

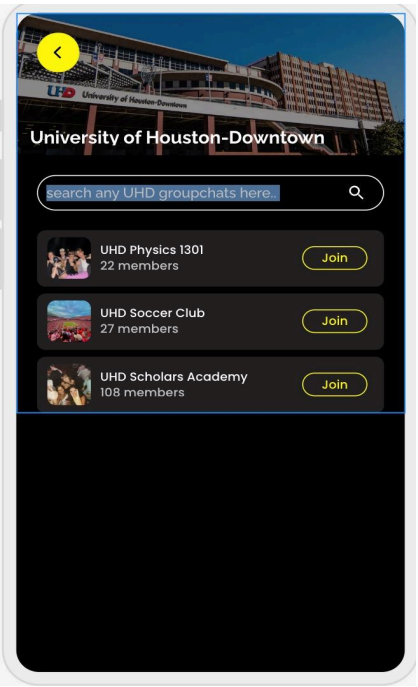
High volumes of data being cached caused memory constraints. Redis configuration was modified to allocate 1 GB of RAM for caching, and we set up automatic eviction policies to clear out old data, reducing memory consumption.

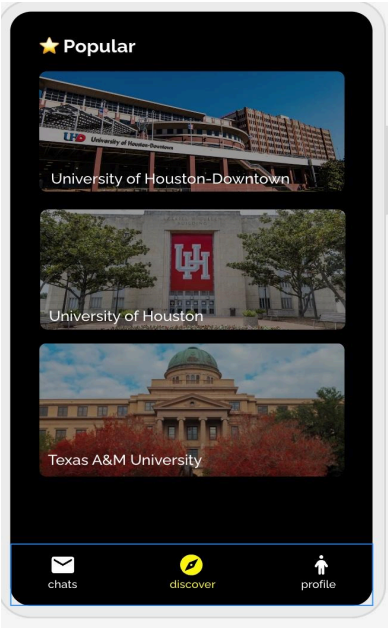
**State Management Complexity:**

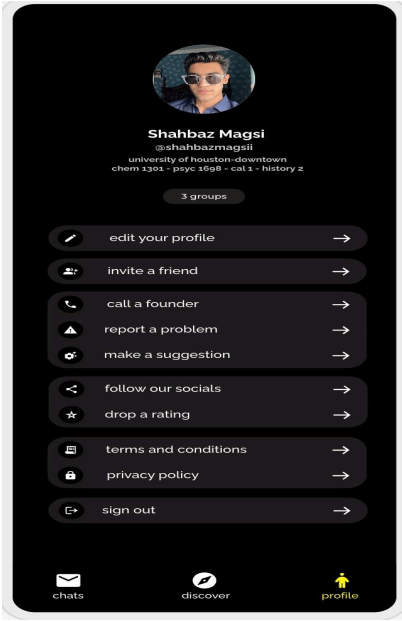
Using Redux to manage complex state across various screens initially led to performance bottlenecks. We optimized Redux selectors and structured state handling, significantly improving performance and reducing re-render times.

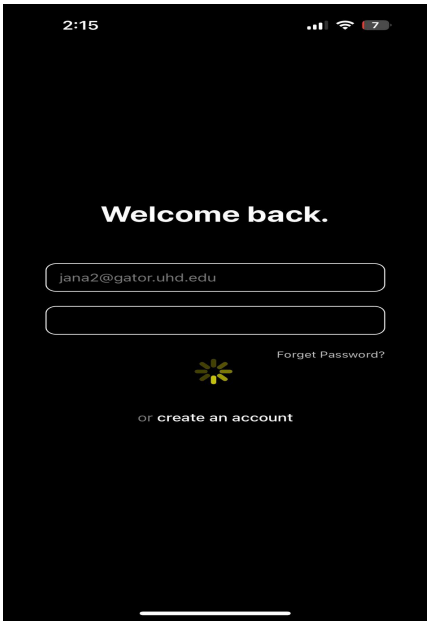

Groupchats
New group
Ususjs
Hsjss
create a groupchat
chats
discover
profile


UHD Physics 1301
22 members
@gracewilkins left the groupchat
@shahbazmagsi joined the groupchat
Mon, July 27th, 3:48 pm
Shahbaz Magsi
Where is Ali guys??? I have been looking for him.
Evie Kohn
I wish I knew! I have also been looking.
Melissa Parks
What happened guys? I also need to talk to Ali. He took my laptop the other day and copied all the homework and now professor is failing for plagirising my own homework. WHAT THE FUCKKKKK IS WRONG W HIM
Ali Khan
Oh hi guys.. miss me??
Melissa Parks
write something..


University of Houston-Downtown
search any UHD groupchats here..
UHD Physics 1301
22 members
Join
UHD Soccer Club
27 members
Join
UHD Scholars Academy
108 members
Join


Popular
University of Houston-Downtown
University of Houston
Texas A&M University
chats
discover
profile


Shahbaz Magsi
@shahbazmagsii
university of houston-downtown
chem 1301 - psyc 1698 - cal 1 - history 2
3 groups
edit your profile
invite a friend
call a founder
report a problem
make a suggestion
follow our socials
drop a rating
terms and conditions
privacy policy
sign out
chats
discover
profile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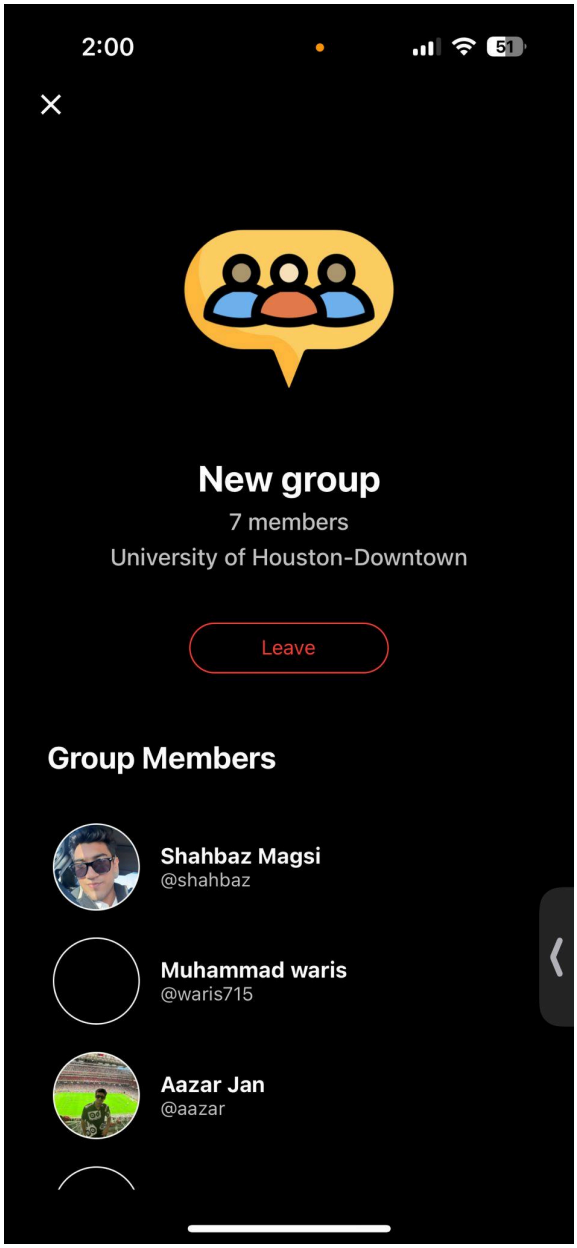
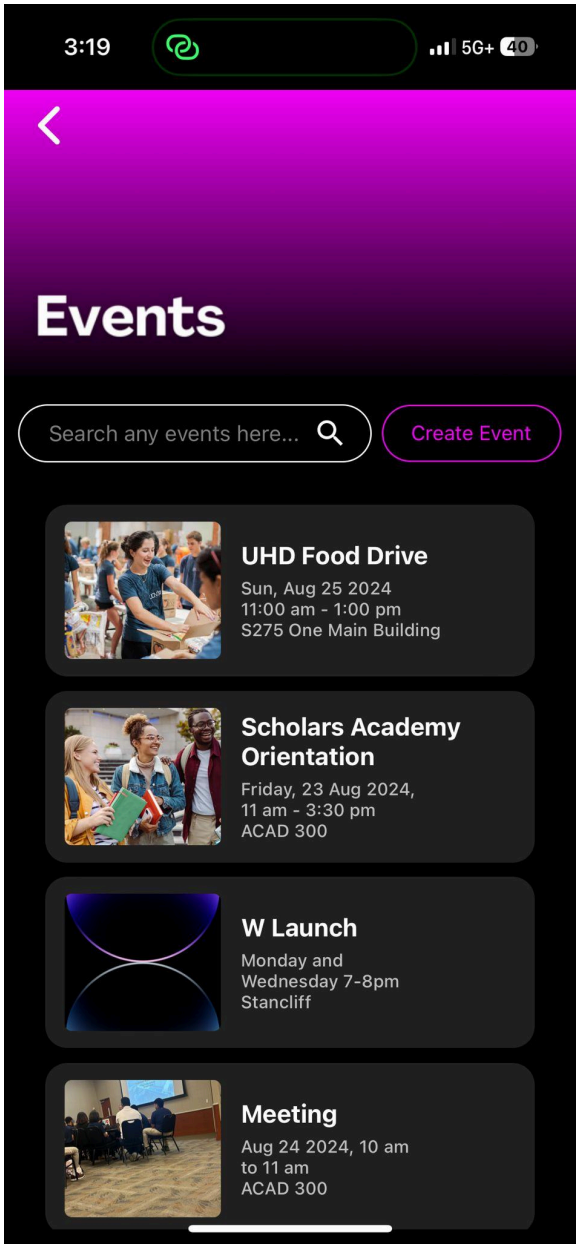
Welcome back.
jana2@gator.uhd.edu
Forget Password?
or create an account


2:00
New group
7 members
University of Houston-Downtown
Leave
Group Members
Shahbaz Magsi
@shahbaz
Muhammad waris
@waris715
Aazar Jan
@aazar


3:19
5G+
Events
Search any events here...
Create Event
UHD Food Drive
Sun, Aug 25 2024
11:00 am - 1:00 pm
S275 One Main Building
Scholars Academy Orientation
Friday, 23 Aug 2024,
11 am - 3:30 pm
ACAD 300
W Launch
Monday and
Wednesday 7-8pm
Stancliff
Meeting
Aug 24 2024, 10 am
to 11 am
ACAD 300