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LePhoning

1 Project Summary

LE SSERAFIM is a South Korean pop (K-Pop) girl group that debuted in 2022. Since their first release, they have steadily gained popularity, and they currently have 14.1 million monthly listeners on Spotify. However, they do not have a centralized platform for fans (“Fearnots”) to interact with the members of the group, with Fearnots taking to Twitter, TikTok, and Reddit to discuss and bond over LE SSERAFIM updates and music. This is where LePhoning comes in! LePhoning is an all-inclusive platform for fans to keep up with everything about LE SSERAFIM.

2 Description of Application

We will design a web application to allow fans of LE SSERAFIM to engage with their content in a more personalized and meaningful way online. Our application will offer features such as messaging, live broadcasts, photos and videos of the members, a calendar of events, and integration with LE SSERAFIM’s official web page, allowing fans to stay updated and engage directly with their favorite group in an all-in-one experience. Additionally, we will offer a freemium model where users can pay for a subscription to access exclusive app features.

3 High-Level Changes from Original Proposal

Our application LePhoning turned out to be very similar to what we had envisioned during the submission of the original proposal. Along the way, there were a few design and technical challenges that we encountered that questioned our original decisions for the method of implementation for certain features, however, after thorough research of industry standards and modern technology tools, we were able to find workable solutions to our challenges and implement all features as listed in our original proposal. These features are as follows:

High Priority Features:

1. Chat (creation, storage, and updating)
2. User Profile (creation, deletion, database management)

3. Media (photos, videos)

Low Priority Features (Stretch goals – Future):

- Song + New Release streaming
- Calendar
- Live Stream feature with chat + like/react

There aren't any other things that changed when comparing the final application to the original proposal, however, we did decide to add certain features like a chatbot that users are able to utilize upon login that connects directly to our database to let them make changes to their account as well as subscribe/unsubscribe from our premium model from.

4 Application Usefulness

Our application, LePhoning, successfully achieved its intended usefulness as outlined in our original proposal. We set out to create a centralized platform for Fearnots that would provide comprehensive access to LE SSERAFIM news, updates, and media while fostering fan engagement and community bonding. In its current state, we believe the app is very close to being deployable as a real application for other LE SSERAFIM fans, delivering on the promises we made at the project's outset. One of the core strengths of LePhoning lies in its ability to consolidate the scattered ecosystem of information that fans often have to piece together from various platforms like Instagram, Reddit, Twitter, and TikTok. Instead of requiring fans to scour multiple social media channels for updates, LePhoning provides a single, easy-to-use interface where users can access: The app features a dedicated calendar and updates section that aggregates information about upcoming events, tours, concerts, collaborations, and sponsorships. Additionally, it serves as a reliable hub for teasers and clips of new song releases, ensuring fans never miss out on LE SSERAFIM's latest activities. FEARNOTs can view a detailed calendar of all scheduled events related to the group, offering a structured and organized way to stay informed about LE SSERAFIM's schedule. Beyond being a news source and a central hub for FEARNOTs, LePhoning provides interactive tools for fans to engage with each other. Chat functionalities allow users to bond over shared interests, favorite songs, and performances. Furthermore, AI-powered chatbots simulate conversations with the members, offering a unique layer

of interaction and personalization that no other platform currently provides. Through these features, LePhoning addresses a major pain point for FEARNOTs: the time-consuming and often frustrating process of gathering updates from multiple sources. By centralizing everything fans need in one platform, we've created a tool that not only saves time but also enhances the overall fan experience.

While the app is highly functional, there are areas that could be refined to maximize its usefulness such as expanded content integration; we'd like to work on integrating more diverse sources, such as exclusive behind-the-scenes content and personalized notifications, could further enhance its appeal. Additionally, to maximize usefulness for most FEARNOTs, we'd like to add localization features such as supporting multiple languages, starting with Korean and English, could make the app more accessible to the global Fearnots community.

5 Application Schema

We made minimal changes to our initial ER diagram schema, as the initial design proved sufficient for the requirements of the application. Both schema diagrams attached reflect the core structure of the app's backend, with tables like User, Messages, Shop, Events, and Media. While the schema stayed consistent, our approach to sourcing data for the application saw significant adjustments. Initially, we planned to scrape multiple types of media, including photos and videos, but due to memory constraints and performance considerations, we limited scraping to photos. To gather images, we implemented a legalized Google scraping algorithm that allowed us to collect content in small, manageable batches, ensuring the script adhered to Google's terms of service and was not abused. Additionally, we set up scraping for LE SSERAFIM-related content from Reddit (r/le-sserafim), which became one of our primary sources for both fan-generated and official content. However, we decided against scraping videos because of the high memory usage required for storing and processing them, prioritizing the app's smooth operation and scalability for the scope of this project. For other platforms, Twitter scraping was not pursued due to updated API restrictions and the inability to scrape content without violating their terms, and Instagram scraping was deemed too complex without official permissions, as its API restricts access to media content for non-partner applications.

6 Key Design Changes

Our application underwent several high-level design changes to enhance functionality and provide a more personalized experience for users. While the original ER diagram served as a solid foundation, we introduced additional tables and attributes to meet emerging requirements during development. These updates allowed us to better curate content and ensure that users enjoy a tailored and engaging experience. One of the most significant changes was the addition of `ShopPreferences`, a new relationship that connects user preferences to items in the `Shop` table. This feature enables fans to filter merchandise based on their biases, such as their favorite LE SSERAFIM members, or interests in specific event-related items. Personalizing the shop feed in this way ensures that fans see the products they are most interested in, making the shopping experience more relevant and enjoyable.

We also introduced a `Member` table to represent individual members of LE SSERAFIM. This table connects with other entities, such as `Media` and `Events`, to manage specialized permissions and content related to each member. For instance, members now have permissions to upload exclusive content, such as behind-the-scenes photos or event-specific media, which is directly linked to their profiles. This structure ensures that content and events associated with specific members are well-organized and displayed in a way that resonates with fans. Another major improvement was the curation of the shop feed based on user biases. By leveraging the `Member` table and `ShopPreferences`, we implemented a system that dynamically adjusts the shop feed to highlight merchandise and media related to the user's favorite LE SSERAFIM member. This creates a more personalized and meaningful connection between fans and the app, enhancing user engagement and satisfaction.

7 Differences Between Original and Final Design

The original design lacked features like the `Member` table and the connection between user preferences and shop items, which limited the app’s ability to deliver personalized experiences. In contrast, the final design includes the `ShopPreferences` and `Member` tables, which allow us to curate content and merchandise dynamically while managing individual member permissions for uploading content and linking events. The final design is far more suitable for achieving the app's goals of creating a centralized, personalized platform for Fearnots. The additions of the `ShopPreferences` and `Member` tables not only enhance the user experience but also position the app for

future scalability. For example, we can now add features like member-specific notifications or more granular fan engagement tools. By focusing on user biases and individual member contributions, we successfully designed a system that balances fan engagement with technical efficiency, ensuring the app meets both immediate and long-term needs.

8 Technical Challenges during Implementation

Abhishek: A significant challenge I faced was in the initial stage of the project, when we were setting up the VM and Cloud SQL database on GCP. Learning the nuances of that, getting it up and running and populating the tables was quite challenging and a great learning experience.

Nithin: One significant technical challenge I faced was overcoming the limits of triggers, and converting that functionality to use a stored procedure instead. This is because I was unaware that triggers cannot modify the table that caused the trigger. This meant that, for chat message limiting, I could not use a trigger that ran after an insert into the Messages table, and instead, I created a stored procedure that removed the oldest messages beyond the 10 most recent; this stored procedure runs every time a batch insert into Messages occurs.

Neil: One significant technical challenge I faced was transitioning from scraping photos to videos, which required rethinking our approach due to the substantial memory usage and processing demands associated with storing and handling video files. I adapted our scraping algorithm to handle small, incremental batches for compliance and scalability, particularly for curated content in the shop feed.

Ritvik: One significant technical challenge I faced was connecting user authentication with the entire application and database. This involved using the useContext hook along with local storage to maintain a global shared state and retrieving that across different pages of the application whenever a user was logged in. Additionally, implementing the chatbot was challenging because the chatbot had to be able to service a wide range of requests while performing suitable and safe CRUD operations on the database. I decided to implement a ChatGPT wrapper to parse user messages and formulate SQL queries based on them. I also enforced checks on the generated SQL queries to ensure that they were safe to execute on the database and did not expose private or sensitive information.

9 Future Work and Expansion Ideas

We are extremely proud of our work on LePhoning, and we hope that it serves as a good baseline for other community-based applications that we create in the future. Some potential future work includes site-wide chat, where users can interact with other users in real time (beyond just the livestream chat). We can also expand the functionality of the ShopPreferences and ContentPreferences settings of the user to help personalize their experience further, singling out products, events, and live streams that the user would enjoy based on their favorite LE SSERAFIM member and preferred engagement type (such as streams, tours, and meet-and-greets).

10 Work Distribution

The team collectively decided on database schemas, worked on project stages and collaborated on design ideation at every step of the project. In terms of the application, the team also collaborated on the Chat page, ensuring seamlessness and ease-of-use keeping our ideal audience's UX in mind. Individually speaking, Abhishek worked on setting up the database tables, user authentication, ensuring user sign up, sign in and database management for the same. He also worked on adding a Livestream feature to the application that comes with a live chat. Ritvik worked on the chat feature connected with the database to allow users to talk to LE SSERAFIM member bots, implemented a chatbot to service users on the landing page and wrote the profile page. Ritvik also contributed to the shop page and integrated user authentication with the entire application and database to ensure sitewide login. Nithin worked on some of the shop as well as the triggers, stored procedures, and transactions portion of the project. Neil worked on the landing page for the application, as well as most of the frontend styling. Neil also worked on scraping photo, videos, and media content for the shop and media page and integrated it with the database.