

Project Report

Course: INF 654

Final Project

Project Overview (2 points)

The Micro Tracker is a progressive web application that allows users to easily track their meals and nutritional consumption. Its principal function is to enable users to monitor meals, establish daily calorie targets, and check nutritional information. This PWA website provides data security and availability in both online and offline modes, utilizing Firebase for cloud storage and IndexedDB for offline capabilities.

Target audience:

The app is designed for people who want to maintain a healthy lifestyle by tracking their food habits and calorie consumption. It is great for health-conscious individuals, exercise enthusiasts, and anybody wishing to improve their diet.

Technical Implementation

Technology Stack and Main Components

1. Firebase:

- Used for cloud storage, real-time databases, and user authentication.
- Ensures that data is stored securely and synchronized across devices and sessions.
- Each user's data is uniquely identified with his Firebase-authenticated account.

2. IndexedDB:

- Handles data storage offline, hence providing the facility for CRUD without an active internet connection.
- Firebase synchronizes the data when it gets online again.

3. Service Worker:

- All necessary assets and scripts can be cached so that the core functionalities are supported offline.
- Improve the performance by reducing network dependency.

4. Manifest.json:

- Configures the PWA to enable users to install the application on their devices and access it just like any native app.

How It Supports User Authentication and Secure Data Management:

1. Firebase Authentication can ensure that each user's data is securely linked to their account.
2. Data is stored securely in Firebase Firestore or Realtime Database, synchronized with IndexedDB during offline use.
3. Service workers manage cached resources to ensure seamless access to data and enhance the user experience.

Challenges and Solutions

There are a few technical problems that were encountered during the building of the Micro Tracker website. One of the primary challenges was ensuring seamless data synchronization between IndexedDB and Firebase during the app's transition from online to offline mode. Maintaining the app's functionality when it was offline brought new challenges, notably in terms of ensuring that CRUD procedures continued to run as expected. The solution for this includes fixing any potential bugs that may have arisen during data synchronization after the app was back up. To address these issues and minimize conflicts during data synchronization, user data was linked with Firebase-generated UIDs. Additionally, service worker logic has been modified to cache all essential scripts and assets, allowing the application to continue to execute uninterrupted when offline. Strong error-handling methods were also included, alerting users to any potential difficulties and keeping them updated on the status of their data synchronization. These solutions guaranteed my website would run smoothly both online and offline.

Lessons Learned

I learned many things while developing the Micro Tracker. I learned how to use Firebase for secure data management and user authentication so that user data could be safely saved and accessed across devices. I also learned how to use IndexedDB for offline capabilities, which smoothly synchronized data with Firebase once the app was back online. This technique helped me improve my debugging abilities, particularly when it comes to synchronization and cache. In addition, I worked on Progressive Web Application development, including service worker and manifest.json setup, which increased the app's offline functionality and usability.

Future Expansion

Potential improvements and new features in Micro Tracker might improve its operation and user experience: Enhanced analytics will allow consumers to understand their eating patterns in greater depth over time, using visuals such as graphs and trends to represent progress more naturally. I plan to add more language support so that the program may be used by more

individuals in other nations, introducing it to most of the global population. Another choice that might help users connect and establish communities is social sharing via social media, which allows users to share their favorite meal plans or triumphs with others via integrated social media. With these enhancements, the Micro Tracker might go from a simple nutrient tracking tool to a more comprehensive health management tool.

By addressing these upgrades, Micro Tracker may become a more adaptable and comprehensive diet management website.