Opus: Mobile Financial Education Application

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ABSTRACT

Financial literacy is an essential but often overlooked skill among teens and young adults. This project addresses that gap through a mobile iOS app that teaches key financial concepts via an intuitive interface and interactive modules. The app includes secure Google Single Sign-On (SSO), dynamic Markdown- based lessons, and progress tracking for a personalized experience.

Contributions included both front- and back-end development, including UI design, view implementation, and lesson rendering. With support from a technical mentor, responsibilities also included implementing Google SSO and helping to establish a CI/CD pipeline, ensuring secure authentication, and reliable performance and deployment.

GOOGLE SINGLE SIGN-ON

With the assistance of a mentor, Google SSO was implemented using Swift, Firebase, and the GoogleSignIn SDK in Xcode. As shown in Fig. 1, the OAuth 2.0 authentication process begins when users select the Google sign-in option from the app's welcoming interface. Firebase was initialized in the AppDelegate, enabling secure backend authentication services that handle the token exchange process. Authentication state, user data, and error handling were managed using a dedicated SwiftUI ObservableObject, ensuring seamless integration with the OAuth 2.0 flow.

Once the authorization code is exchanged for an access token, the app presents a personalized user experience displaying the user's profile picture, name, and email, along with navigation tabs for different app sections. This secure login system supports persistent sessions and smooth transitions across views, offering users a fast, reliable, and personalized experience while maintaining credential security through Google's OAuth 2.0 protocols.

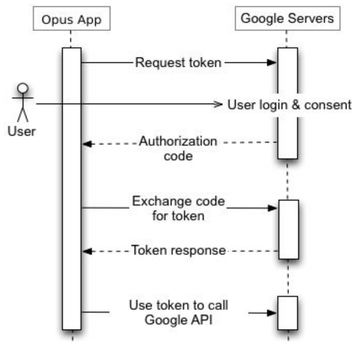

Fig. 1 Flow Diagram

DYNAMIC LEARNING MODULE SYSTEM

For the educational content component of the Opus app, a dynamic learning module system was developed using SwiftUI and MarkdownUI. Content is presented through a simple, paginated interface that manages display and navigation, allowing users to progress smoothly through each module. As illustrated in Fig. 4, the system dynamically loads content from Markdown files stored in the app bundle, allowing for easy content updates without code changes. Interactive elements were incorporated, such as a custom retirement calculator that appears contextually within specific modules. The interface features a page indicator showing the current position within the module, intuitive navigation controls, and automatic progress tracking that updates as users advance through lessons. This architecture ensures content adaptability while maintaining consistent UI patterns across different learning modules, enhancing user engagement.

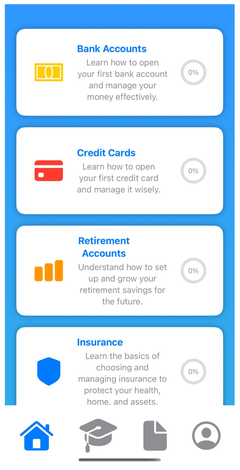

Fig. 2 Home Screen

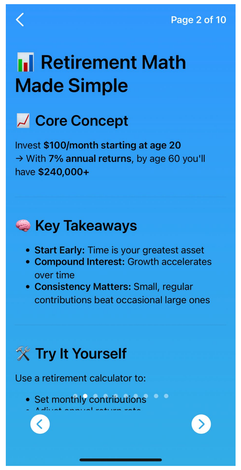

Fig. 3 Markdown Page

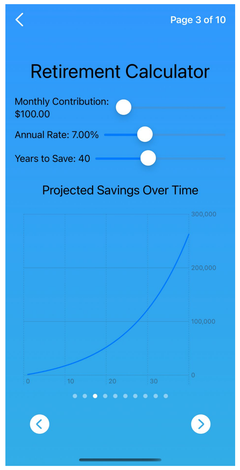

Fig. 4 Retirement Calculator

The home screen of the Opus financial education app presents four main learning modules to guide users through essential financial topics (Fig. 2). As shown in Fig. 3, the app's tutorial pages leverage a dynamic markdown content system to render educational materials seamlessly. Complementing the content, practical tools like the interactive retirement calculator allow users to engage directly with financial concepts by adjusting parameters such as contribution amounts and saving duration using sliders (Fig. 4). Together, these elements create an integrated learning experience that combines clear navigation with hands-on practice.

LEARNING TOOLS

To enhance user engagement and practical understanding, interactive learning tools were integrated throughout the educational modules using SwiftUI. These tools complement the markdown-based content delivery system by providing hands-on financial calculators and simulations. For example, a custom retirement calculator allows real-time adjustment of parameters such as monthly contributions, annual returns, and investment timeline through slider controls. The calculator dynamically updates projected savings visualizations using SwiftUI's reactive framework, enabling users to experiment with different scenarios and immediately observe the effects of compound interest. Other interactive features similarly reinforce theoretical concepts through practical application and immediate visual feedback.

SUMMARY

Opus is an easy-to-use iOS app designed to help young people build essential financial literacy through interactive, self-paced lessons. Featuring secure Google SSO and dynamic Markdown-based content, Opus delivers personalized learning with smooth navigation and automatic progress tracking. The app includes practical, hands-on tools like an interactive retirement calculator, allowing users to explore real-world financial scenarios. Built for reliability and speed, Opus provides an engaging and accessible platform to empower the next generation with the knowledge they need to manage their money confidently.

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