Functional Description

Sage is a multifunctional financial management application designed for individuals to keep track of account balances, assets and liabilities, and their financial goals. Financial literacy is a critical skill in life, and Sage aims to empower users by reducing barriers to managing personal finances. With a clean, easy-to-navigate design, Sage intends to foster user confidence in understanding and improving their financial health.

The app allows users to add and manage multiple accounts, including bank accounts like savings and checking, investment portfolios, or even informal cash reserves. Users can monitor their net worth by tracking their assets—such as property and stocks—alongside liabilities like loans and credit card balances. This consolidated view of financial health simplifies decision-making and helps users take control of their finances.

Sage also includes a goal-setting feature which allows the user to define and manage a financial goal, such as saving for a house or paying off debt. Using an intuitive user interface and clear visual progress tracking, Sage motivates users and keeps them accountable, turning goals into achievable milestones.

Designed for individual use, Sage provides a comfortable and calming environment where users can confidently manage their finances without feeling overwhelmed. The app's features appeal to a wide range of users, from young adults learning to navigate this increasingly complex financial word to seasoned professionals seeking a new, unique financial view. Future updates to Sage may include expanded functionality by integrating with banking platforms to allow for automatic changes to account balances.

Market Survey and Comparison with Similar Apps

The financial management app market is highly competitive, with numerous applications offering tools to track expenses, manage budgets, and monitor investments. This section intends to evaluate Sage and compare it with current and previous market leaders: Mint, YNAB, and EveryDollar.

Mint

Mint, once a leading financial management app, allowed the users to track expenses and manage budgets, linking accounts for real-time updates and insights into their financial health (Mint, n.d.). Launched in 2006 and later acquired by Intuit, Mint quickly gained popularity for its ease of use and extensive features. These features included budgeting tools and expense allocations, account aggregation, and credit monitoring.

Though widespread, Mint had limitations. The app's rigid and sometimes intimidating budgeting tools, frequent and obtrusive in-app advertisements, and concerns about privacy were drawbacks for users. In 2023, Intuit announced Mint's discontinuation, instead encouraging users to use Credit Karma Money, a service with a stronger emphasis on credit monitoring but at the cost of the financial management tools offered by Mint.

Mint's legacy as a tool for simplifying personal finance has inspired many subsequent apps, including Sage. Many companies market their apps as "Better than Mint" (Copilot Money, n.d.) and as the Forbes' "Best Mint Replacement" (Monarch Money, n.d.).

YNAB

You Need a Budget (YNAB) is a leading personal finance app known for its unique approach to budgeting (You Need a Budget, n.d.). Founded in 204, YNAB tells users to "give every dollar a job", a philosophy which encourages proactive management of money and intentional spending.

YNAB takes a unique approach to financial health, saying that "budgeting is boring and restrictive, [...] easy to fail" (Why YNAB is different, n.d.), encouraging users to instead create and alignment between how they spend their money and how they want to spend their life. YNAB's key features include manual goal creation, real-time syncing across devices, and user education to help improve understanding and financial literacy. Though well reviewed and enjoyed by users, the app has a few drawbacks. YNAB operates on a subscription model, currently $14.99 USD per month or $109 USD annually after a free 34 day trial, limiting accessibility for some users. Additionally, the app emphasizes manual data entry which may act as a barrier for users seeking a quick and automated solution.

In spite of these limitations, YNAB is a dominant player in the financial management market, especially for mobile and cross-platform users. It boasts a high percent of user surveys reporting improved finances and financial understanding since starting YNAB (YNAB, n.d.).

EveryDollar

EveryDollar is a budgeting app developed by Ramsey Solutions, a company owned by radio personality and financial expert Dave Ramsey (EveryDollar, n.d.). It is designed to help users create and stick to an "easy-to-use zero-based" budget where every dollar is given a job (EveryDollar, n.d.).

EveryDollar offers both a free and a premium version of the app, each with different functionality. The free version allows users to create and manage budgets, manually track transactions, and set due dates for bills. The premium version, which costs $79.99 USD annually, includes all free features in addition to automatically importing transactions, planning spending around paychecks, custom budget reports on income and spending, and net worth calculations and projections.

EveryDollar boasts a straightforward and user-friendly interface, making it accessible to users who are new to budgeting. It encourages users to prioritize saving and minimize expenses;

however, the limited functionality of the free version pushes users towards the premium option, which may be out of budget for some users.

EveryDollar gained and maintained popularity due to its direct and simple methods. While it is more focused on budgeting as opposed to a holistic approach to financial management, it serves as a strong tool for user's who prefer a structured approach to finances.

Sage

Sage was developed as a financial management app for users who want to take control of their finances without feeling overwhelmed or constrained by rigid rules. Many existing finance apps impose strict budgeting techniques and financial goals that don't work for everyone, often making users feel more stressed than empowered. Sage was designed to offer a simpler, more flexible solution—one that provides a clear overview of a user's finances without the pressure of strict requirements.

While inspired by applications like Mint, Sage does not seek to offer the extensive, data-heavy features of larger financial tools. Instead, it aims to show that managing finances can be straightforward and stress-free. Sage acts more like a personal sandbox, allowing users to manually input their own financial data and use it in whatever way feels most comfortable to them.

Future updates may include features such as banking synchronization to streamline data entry, but Sage will continue to prioritize ease of use and financial literacy over strict budgeting methods or overly detailed financial analytics. The goal remains to help users manage their money in a way that reduces stress and promotes better understanding of their finances.

Code description

The app Sage was developed in Android Studio using Java for classes and Kotlin for Gradle configuration. It uses Firebase Firestore to store all user data and follows the Model-View-Controller (MVC) design pattern to ensure data integrity and smooth operations.

The app is fully responsive, with unique layouts for portrait and landscape modes, and supports day and night modes that can be toggled in settings.

User Data

User data is stored as an instance of the User class, which includes:

- Attributes: Name, a list of Accounts, assets, liabilities, and a list of Net Worth objects.
- Accounts: Contain a name and balance.
- Net Worth: Stores a date and a net worth balance.

Each activity loads user data on entry and saves it whenever changes occur, ensuring up-to-date information in Firestore.

Activities Overview

1. Main Activity
   - Functions as the login page.
   - Users sign in or create an account using Firebase Authentication (signInWithEmailAndPassword and fetchSignInMethodsForEmail).
2. Welcome Page Activity
   - Displays a personalized welcome message.

- ○ Prompts for a nickname if the user is new and initializes their User object.
- ○ Structure:
    - i. If user data exists → Load and display data.
    - ii. Else → Create a new User and save it.

3. Account Manager Activity
    - ○ Main activity for managing accounts: creating, editing names/balances, and deleting accounts.
    - ○ Structure:
        - i. Load user data and populate accounts in a TableLayout.
        - ii. Add Account → Open dialog, create account, save to Firebase.
        - iii. Delete Account → Confirm deletion, update User, save to Firebase.
        - iv. Edit Account Name/Balance → Open dialog, update data, save to Firebase.

4. Net Worth Calculator
    - ○ Allows users to manage assets, liabilities, and calculate net worth.
    - ○ Uses a NestedScrollView to accommodate large data on all screen sizes.
    - ○ Displays a graph showing current and historical net worth.
    - ○ Structure:
        - i. Load user data.
        - ii. Sum assets and liabilities.
        - iii. Add the total as net worth history and save.

5. Goal Tracker Activity
    - ○ Allows users to set financial goals, track progress, and view contributions in a pie chart.
    - ○ Structure:
        - i. Load user data.

        ii.   Update goal name, target, and progress.

       iii.   Track contributions from selected accounts or manual input.

      iv.   Save updated data to Firebase.

6. Settings Activity

   ○ Contains a night mode toggle (stored in SharedPreferences).

   ○ Allows users to permanently delete their account with confirmation.

7. Currency Exchange Fragment

   ○ Provides a dialog for currency conversion using real-time exchange rates from an external API.

Design Features

- User Help: Each activity includes a help button with an alert dialog explaining its functionality.

- Navigation: All activities (except Main Activity) have a navigation bar with five buttons. The current activity's button is disabled and visually distinct.

- Data Integrity: User data is saved globally and updated in Firebase Firestore after each change.

Product specification sheet

Tools and Technologies

- IDE: Android Studio

- Programming Language: Java

- Build System: Gradle (Kotlin DSL)

- Database: FireBase Firestore

Libraries Used

1. GSON
   - Purpose: Stores and formats a list of currency names and product codes.
   - Use Case: Prepares data for dropdown menus in the Currency Exchange Fragment.
   - Source: https://github.com/google/gson

2. MPAndroidChart (v3.1.0)
   - Purpose: Displays line charts for visual data representation.
   - Use Case: Visualizing net worth history over time in the Net Worth Calculator.
   - Source: https://github.com/PhilJay/MPAndroidChart

3. GraphView (v4.2.2)
   - Purpose: Displays pie charts for visual progress tracking.
   - Use Case: Visualizing financial goal progress in the Goal Tracker Activity.
   - Source: https://github.com/jjoe64/GraphView

4. ExchangeRate-API
   - Purpose: Fetches real-time exchange rates for global currencies.
   - Use Case: Enables currency conversion in the Currency Exchange Fragment.
   - Source: https://www.exchangerate-api.com

APIs and External Services

- FireBase Firestore

  - Purpose: Real-time cloud-based NoSQL database.

  - Use Case: Stores and retrieves user data, including accounts, net worth, and financial goals.

- ExchangeRate-API

  - Purpose: Provides up-to-date exchange rates for 161 currencies.

  - Integration: Used to enable accurate currency conversions.

Frameworks and Design Principles

- Model-View-Controller (MVC)

  - Ensures data integrity and a clean separation of concerns.

- Responsive Layout Design

  - Supports both portrait and landscape orientations.

  - Implements day/night modes with unique themes.

Features

1. User Authentication

- Secure login with email and password.
- First-time users set a nickname.

2. Account Management

- Add, edit, and delete accounts.
- Changes are synced with Firebase Firestore.

3. Net Worth Calculator

- Calculate net worth by summing assets and liabilities.
- Displays net worth history with a line chart.

4. Goal Progress Tracker

- Set and track financial goals.
- Visualize progress with a pie chart.

5. Currency Converter

- Convert amounts between currencies using live rates from the ExchangeRate-API.
- Currency list populated with Gson.

6. Dark/Light Mode

- Toggle between dark and light themes in settings.

7. Data Persistence

- All user data saved and loaded from Firebase Firestore.

Test cases

There were two primary types of test cases used in the development of this application: (1) data and database test cases and (2) visual test cases. Both were tested for each activity.

Main Activity:

Feature to Test	Test Steps	Expected Outcomes	Test Successful?
Sign In	Enter a valid and created email and password Click the sign in button	Toast indicating sign in successful Activity change to Welcome Activity	Yes
Sign In (false credentials)	Enter a valid email but invalid password Click the sign in button	Toast indicating false credentials	Yes
Sign In (Email not associated with user)	Enter an email address which is not associated with a user Click the sign in button	Toast indicating bad sign in	Yes
Create Account (Account already created)	Enter a valid, associated email and password Click the create account button	Toast indicating the account already exists	Yes
Create Account (valid unassociated email and password)	Enter a valid and unassociated email and password Click the create account button	Toast indicating the account was created Activity change to Welcome Activity	Yes
Help Button	Click the help button	Dialog popup showing the appropriate message	Yes

Welcome Activity

Feature to Test	Test Steps	Expected Outcomes	Test Successful?
New User - Prompt for name and display	Enter the activity with a new user	Dialog asking for a name Updates welcome message	Yes - Name stored in FireBase
Existing user - display name	Enter the activity with an existing user	Welcome message displays name	Yes - Tested again after modifying name

			in FireBase
Help Button	Click the help button	Dialog popup showing the appropriate message	Yes
Currency Exchange Button	Click the currency exchange button	Dialog popup showing the currency exchange fragment	Yes

Account Manager Activity

Feature to Test	Test Steps	Expected Outcomes	Test Successful?
Add account	Press add account button Enter account name Enter account balance	Account added to Account list in FireBase Account displayed in TableLayout	Yes
Add account (no balance)	Press add account button Enter account name	Account added to Account list in FireBase Account displayed in TableLayout	Yes
Add account (no name)	Press add account button Enter account balance	Account added to Account list in FireBase Account displayed in TableLayout	Yes
Delete Account (single)	Press delete account button Select an account to delete	Account deleted from Account list in FireBase Account no longer displayed in TableLayout	Yes
Delete Account (multiple)	Press delete account button Select multiple accounts to delete	Accounts deleted from Account list in FireBase Accounts no longer displayed in TableLayout	Yes
Change Account Name	Click on account name Enter a new name	Account name changed in FireBase Account name	Yes

		changed in display	
Change Account balance (add)	Click on account balance Enter number Press add	Account balance increased by input amount in FireBase and display	Yes
Change Account balance (subtract)	Click on account balance Enter number Press subtract	Account balance decreased by input amount in FireBase and display	Yes
Change Account balance (replace)	Click on account balance Enter number Press replace	Account balance replaced by input amount in FireBase and display	Yes
Help Button	Click the help button	Dialog popup showing the appropriate message	Yes
Currency Exchange Button	Click the currency exchange button	Dialog popup showing the currency exchange fragment	Yes

Net Worth Calculator Activity (all tests for assets were repeated for liabilities)

Feature to Test	Test Steps	Expected Outcomes	Test Successful?
Add Asset	Press add asset button Enter asset name Enter asset balance	Asset added to Asset list in FireBase Asset displayed in TableLayout Update net worth in FireBase and display	Yes
Add asset (no balance)	Press add asset button Enter asset name	Asset added to Asset list in FireBase Asset displayed in TableLayout Update net worth in FireBase and display	Yes
Add asset (no name)	Press add asset button Enter asset balance	Asset added to Asset list in FireBase Asset displayed in TableLayout Update net worth in FireBase and display	Yes

Delete asset (single)	Press delete asset button Select an asset to delete	Asset deleted from Asset list in FireBase Asset no longer displayed in TableLayout Update net worth in FireBase and display	Yes
Delete Asset (multiple)	Press delete asset button Select multiple assets to delete	Assets deleted from Asset list in FireBase Assets no longer displayed in TableLayout Update net worth in FireBase and display	Yes
Change Asset Name	Click on asset name Enter a new name	Asset name changed in FireBase Asset name changed in display	Yes
Change Asset balance (add)	Click on asset balance Enter number Press add	Asset balance increased by input amount in FireBase and display Update net worth in FireBase and display	Yes
Change Asset balance (subtract)	Click on asset balance Enter number Press subtract	Asset balance decreased by input amount in FireBase and display Update net worth in FireBase and display	Yes
Change Asset balance (replace)	Click on asset balance Enter number Press replace	Asset balance replaced by input amount in FireBase and display Update net worth in FireBase and display	Yes
Toggle account as asset	Toggle an account in the list to be an asset	Flag set in FireBase Corresponding account disabled in liabilities list Update net worth in FireBase and display	Yes
Graph Button	Click on the graph button	Graph dialog popup Shows the net worth	Yes

		history accurately	
Help Button	Click the help button	Dialog popup showing the appropriate message	Yes
Currency Exchange Button	Click the currency exchange button	Dialog popup showing the currency exchange fragment	Yes

Goal Tracker Activity

Feature to Test	Test Steps	Expected Outcomes	Test Successful?
Goal creation for new user	Enter the goal as a new user	Dialog popup prompting for a goal to be created	Yes
Create a new goal (name and balance)	Enter a name and balance for the goal	Goal name and target amount updated in FireBase Goal name and target amount displays updated Graph updated	Yes
Modify goal name	Click on goal name Enter a new name	Goal name changed in FireBase Goal name changed in display	Yes
Modify target amount	Click on goal amount Enter a new amount	Goal amount changed in FireBase Goal amount changed in display Graph updated	Yes
Modify current amount (toggle accounts)	Click on current amount Toggle an account Click on any button to submit	Flag set in FireBase Update net worth in FireBase and display	Yes
Modify current amount (add)	Click on goal amount Enter a number Click the add button	Current amount increased in FireBase Update current amount display Update graph	Yes

Modify current amount (subtract)	Click on goal amount Enter a number Click the subtract button	Current amount decreased in FireBase Update current amount display Update graph	Yes
Modify current amount (replace)	Click on goal amount Enter a number Click the replace button	Current amount replaced in FireBase Update current amount display Update graph	Yes
Help Button	Click the help button	Dialog popup showing the appropriate message	Yes
Currency Exchange Button	Click the currency exchange button	Dialog popup showing the currency exchange fragment	Yes

Settings Activity

Feature to Test	Test Steps	Expected Outcomes	Test Successful?
Toggle dark mode	Toggle dark mode	Dark mode will enable in all activities, including this one immediately	Yes
Delete user (don't confirm)	Click on delete account button Do not toggle confirmation	Button to submit delete stays disabled	Yes
Delete user (confirm)	Click on delete account button Toggle confirmation Press button to delete user	User documents removed from FireBase Email address is now unassociated Return to Main Activity	Yes
Help Button	Click the help button	Dialog popup showing the appropriate message	Yes
Currency Exchange Button	Click the currency exchange button	Dialog popup showing the currency	Yes

		exchange fragment	

Currency Exchange Activity

Feature to Test	Test Steps	Expected Outcomes	Test Successful?
Exchange from currency 1 to currency 1	Match the two currency codes Enter a value to change	Value should be identical in both fields	Yes
Exchange from currency 1 to currency 2	Match the two currency codes Enter a value to change	Value should be updated Confirm value by comparing to Google currency exchange	Yes
Help Button	Click the help button	Dialog popup showing the appropriate message	Yes
Currency Exchange Button	Click the currency exchange button	Dialog popup showing the currency exchange fragment	Yes

Performance evaluation

Extensive performance evaluation was not performed on the application for this submission.

The application launches quickly on icon click, experiences no significant decreases in

responsiveness, and updates FireBase quickly when data is modified.

Justification of permissions

Internet Permission (android.permission.INTERNET)

- Justification: This permission is required for the app to interact with external services,

    such as Firebase Firestore for data storage and retrieval, and to access the currency

    exchange API for real-time conversion rates. Without internet access, the app cannot

    fetch or save user data, nor provide live currency conversion features.

ACCESS_NETWORK_STATE (android.permission.ACCESS_NETWORK_STATE):

- This permission allows the app to check the network status (whether the device is connected to the internet). It's used to ensure that the app handles network-dependent operations (such as data syncing with Firebase or loading exchange rates) only when there is a valid network connection, preventing errors when offline.

Marketing strategy

The marketing strategy for Sage centers on demonstrating the functionality of the application and the features while highlighting the comfortable and calm environment created within the app. A video has been created highlighting the key aspects of the app, including its user interface, real time data storage, and goal setting tools. The video includes footage of the application in use via screen recording with captions highlighting the features and royalty free , calming lo-fi music to demonstrate the environment that the app strives to create.

By presenting the app's features in an accessible and appealing way, the video aims to attract potential users who are interested in managing their finances, setting goals, and tracking their net worth. Additionally, the video will help convey the app's simplicity and utility, encouraging users to download and try it.

The app will be free to download and all functionality will remain free. Many potential users for Sage and other financial apps have remarked that paying a subscription or even one time fee to help save money and manage finances is counter intuitive. This will also encourage more users to try the application due to there being no investment on their part.

Finally, upon release, the app will be promoted through the Google Play Store's visibility tools, with a focus on reaching users looking for financial management solutions. Positive reviews and user feedback will also play a significant role in its marketing, helping to build credibility and attract more users over time.

Known bugs

At this time, there are no known bugs in the application. The app has been thoroughly tested (see Test Cases) and all features are functioning as expected. However, as the app further used and updated, any potential issues will be actively monitored and addressed in future updates. User feedback will be valuable in identifying and resolving any unforeseen bugs that may arise post-launch.

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