

Functional Requirements Specification

3.1 Stakeholders

The term “stakeholder” can loosely be defined as anyone with an interest in the project.

- **Users**

- The user is at the forefront of the development team’s mind. The application is specifically designed with an intent to address a very basic concern: learn how to spend money better. In this context, the phrase “learn how to spend money better,” means juxtaposing the value of investing and frivolous spending. The user should be operating the app daily, since his/her consistent use will provide a lesson in investing. By working with the app, the user will become familiar with the swings of the stock market, the alarming rate at which senseless spending adds up, and a novel perspective toward the power of investing.

- **Professor**

- Dr. Anas Hourani is the arbiter over the course, and, therefore, this project for CSCI441. The project is designed and developed with minimal supervision, but with the approval of Dr. Hourani. He has created the structure, format, and due dates for the project. The project must meet the standard put in place by him and be formally graded upon completion.

- **Developing Team**

- All four team members began developing this application as part of an assignment in CSCI441, but also with the understanding that the app would fill a need in their lives. During brainstorming, a conclusion was drawn that all team members valued the importance of education and investing. The team decided that a way to combine these two passions would not only be a personal boon, but beneficial to anyone else wanting to learn.

- **Project Testers**

- The team members have several people, who are not part of the development team, that will be testing the project and providing feedback. In some cases, the tests will consist of individuals with a technical background to gain another opinion of the application; in other instances, a tester may be someone completely outside the technical field to best garner an outsider’s perspective.

3.2 Actors and Goals

Actor	Actor's Goal	Type	Use Case Name
User, Database	To create an account using my email, or existing social media Account.	Initiating	CreateAccount (UC-1)
User	To change my password.	Initiating	ChangePassword (UC-2)
User	To reset my password.	Initiating	ResetPassword (UC-3)
User	To delete my existing account.	Initiating	DeleteAccount (UC-4)
User	To view terms and conditions.	Initiating	ShowTermsConditions (UC-5)
System	To give badges for user achievements and meeting criteria.	Participating	GiveBadge (UC-6)
User	To view the input expenditure tutorial.	Initiating	InputTutorial (UC-7)
User	To add an expenditure, location, and personal note.	Initiating	AddExpenditure (UC-8)
User	To edit an existing expenditure, location, or personal note.	Initiating	EditExpenditure (UC-9)
User	To delete an existing expenditure, location, or personal note.	Initiating	DeleteExpenditure (UC-10)
User	To save all user data to the cloud.	Initiating	SaveData (UC-11)
User	To view the track expenditure tutorial.	Initiating	TrackExpenditureTutorial (UC-12)
User	To view previous expenditures.	Initiating	ViewExpenditure (UC-13)
System, Database	To automatically update historical and real-time stock market data.	Participating	UpdateMarketData (UC-14)
User	To view the market data tutorial.	Initiating	ShowMarketDataTutorial (UC-15)

User, Database	To view historical and/or real-time stock market data.	Initiating	ViewMarketData (UC-16)
User	To view the search stock tutorial.	Initiating	SearchStockTutorial (UC-17)
User, Database	To search for a specific stock by the stock (ticker) symbol.	Initiating	SearchTickerSymbol (UC-18)
User	To view the compare-expenditure tutorial.	Initiating	ShowCompareExpenditureTutorial (UC-19)
User	To compare expenditures in a specified timeframe with stocks, also in a specified timeframe.	Initiating	CompareExpenditure (UC-20)
User	To view the purchase-stocks tutorial.	Initiating	ShowPurchaseStocksTutorial (UC-21)
User	To view additional information on purchasing stocks.	Initiating	InquireStocks (UC-22)
User, Database	To view potential earnings in a specified timeframe.	Initiating	ViewPotentialEarnings (UC-23)
User	To turn on expenditure reminder notifications.	Initiating	TurnOnDisplayExpenditureReminder (UC-24)
User	To turn off expenditure reminder notifications.	Initiating	TurnOFFDisplayExpenditureReminder (UC-25)
System	To provide user expenditure reminder notifications.	Participating	DisplayExpenditureReminder (UC-26)

3.3 Use Cases

3.3.1 Use Case Casual Description

UC-1: createAccount

Allows User to register a social media account or a public email address on an application serve to create an InvestME account. This will allow new users of the InvestME app to easily log in to the app using their existing Facebook or Gmail account.

Derived From: ST-1

Note: A User will not need to reauthorize their account if logging into the application from the mobile device/ computer they had previously logged in from.

UC-2: accountModification

Allows registered User of the InvestME application to change their account password in order to keep their account secure.

Derived From: ST-2

UC-3: accountPasswordReset

Allows the User to reset the password of their account if they are unable to log in due to a forgotten password, the user will be able to reset the password of the account.

Derived From: ST-3

UC-4: accountDeletion

Allows a registered User to securely delete their InvestME account in the event that they no longer wish to use the application (<<extend>> UC-2: accountModification).

Derived From: ST-4

Note: The User should receive a notification confirming that they wish to delete their InvestME account. Upon successfully deleting their account the user should receive an email confirming the deletion of the account.

UC-5: termsAndConditions

Allows a registered User to view the terms and conditions of using the InvestME app and how their data will be used (<<extend>> UC-1: Account Creation).

Derived From: ST-5

Note: The terms and conditions shall be presented at the time of account creation as well as on request via a “Terms and Conditions” link.

UC-6: achievementsAndBadges

Allows the InvestME app to give badges based upon the user meeting certain milestones. Badges can be earned by signing up for an account (<<extend>> UC-1: Account Creation), inputting expenditures, etc.

Derived From: ST-6

UC-7: viewTutorials

Allows User to view tutorials on how to perform certain tasks within the InvestME application. The user will have access to how to use the application, how and why to monitor past expenses, how to view and evaluate stock information (historical and real-time), how to search for stocks based on ticker symbols, how to compare stocks given a particular range, and how to buy stocks outside the InvestME application.

Derived From: ST-7, ST-10, ST-13, ST-15, ST-17, ST-19

Note: Tutorials shall be presented after the account has been created. There should be an option to skip the tutorial. The tutorials shall have their own section to refer to specific topics at a later date.

Note II: Stocks can not be purchased in the context of the InvestME application. A link to an outside broker may be established.

UC-8: dataInput

Allows the User to update their personal expenditures in the context of the InvestME application. The user will have the ability to add, edit and delete the amount of each expense.

Derived From: ST-8

Note: This feature allows the user to keep their account up to date.

UC-9: cloudStorage

Allows the User to sync their InvestME account to the cloud. This will allow users to access their account data across a number of different platforms.

Derived From: ST-9

UC-10: trackExpenditures

Allows the User to track previous expenditures in the InvestME application.(<<extend>> UC-7: DataInput).

Derived From: ST-11

UC-11: systemRecommendations

Allows the InvestME app to make recommendations based on the input of previous expenditures by the user (<<extend>> UC-9: TrackExpenditures).

Derived From: ST-11

Note: The applications should make recommendations that benefit the user.

UC-12: viewData

Allows the User to view the historical and real-time data on the stock market of any registered company.

Derived From: ST-14

Note: The data is provided to the user via the Alpha Advantage API.

UC-13: searchData

Allows the User to search for companies in the InvestME app with their ticker symbol or registered company name.

Derived From: ST-16

UC-14: compareExpenditure

Allows the User to compare the date range of expenditures previously entered and compare it to the date range of the specific stock price. The user will see how much could have been earned if the money had been invested from the expenditure instead of being spent on something frivolous.

Derived From: ST-8, ST-9, ST-18, ST-21

UC-15: saveData

Allows the User to save the information searched to their InvestME account in order to apply it to the user's expenditure records.

Derived From: ST-14

UC-16: updateData

Allows the InvestME application to update historical stock data automatically and to provide data on the stock market in real time.

Derived From: ST-12

UC-17: userRequests

Allows the User to request information on how to purchase shares from companies compared to them in the InvestME app.

Derived From: ST-20

Note: Links to online brokerage companies will need to be made available to the user. Perhaps more than one option should be presented.

UC-18: dailyNotifications

Allows User to receive daily notifications from the InvestME app for input of frivolous expenses.

Derived From: ST-23

UC-19: geofencingNotifications

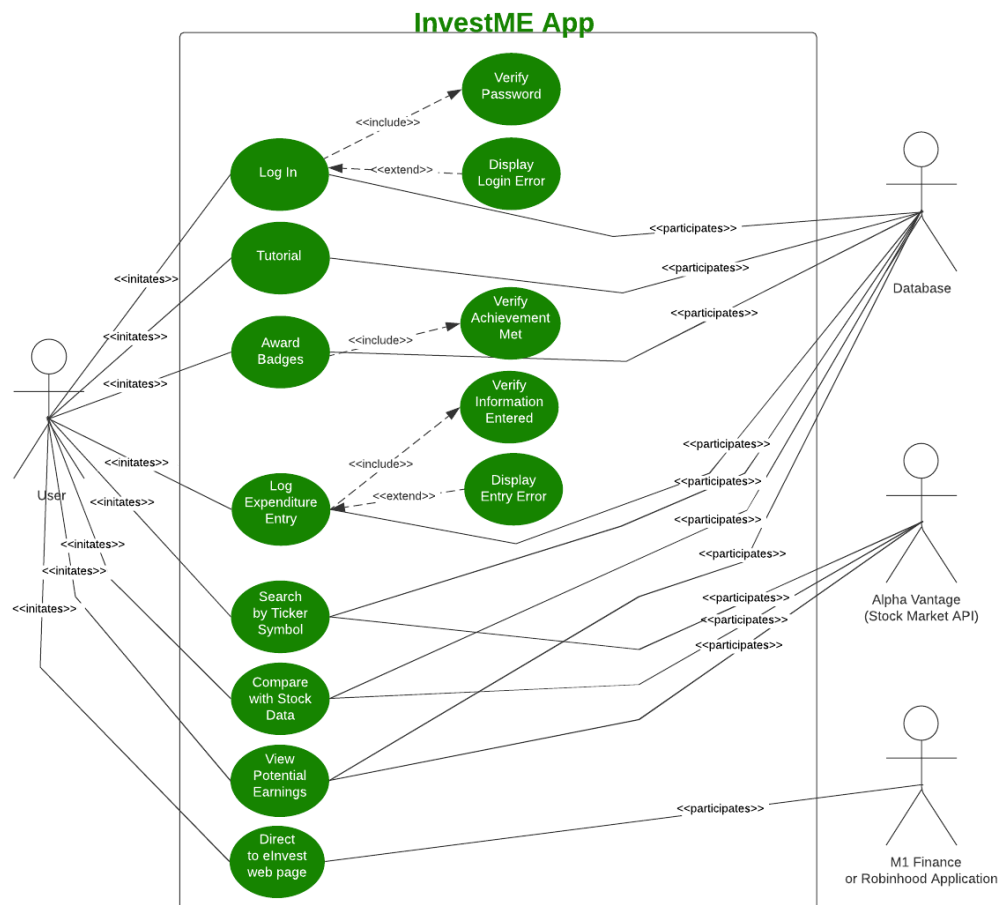
Allows the User to receive notifications to remind them of logging expenses when entering a location where they are known to spend money needlessly.

Derived From: ST-22

Note: In order for this feature to work, Geo-Fencing will need to be enabled in the app. The option to turn the feature off should be available.

3.3.2 Use Case Diagram

The diagram showcases all the use cases. The relationships are indicated by using such as <<include>> and <<extend>>, <<initiates>> and <<participates>>.



3.3.3 Traceability Matrix

Req't	PW	UC-1	UC-2	UC-3	UC-4	UC-5	UC-6	UC-7	UC-8	UC-9	UC-10	UC-11	UC-12	UC-13	UC-14	UC-15	UC-16	UC-17	UC-18	UC-19	UC-20	UC-21	UC-22	UC-23	UC-24	UC-25	UC-26
ST-1	9	X																									
ST-2	4		X																								
ST-3	4			X																							
ST-4	4				X																						
ST-5	2					X																					
ST-6	6	X					X																				
ST-7	4							X																			
ST-8	4								X	X	X																
ST-9	6	X										X									X				X		
ST-10	2												X														
ST-11	3													X													
ST-12	5														X												
ST-13	3															X											
ST-14	7																X										
ST-15	2																	X									
ST-16	3																		X								
ST-17	4																			X							
ST-18	9												X														
ST-19	2																				X						
ST-20	4																					X					
ST-21	8												X											X			
ST-22	5																								X	X	
ST-23	2																										X
Max PW		9	4	4	4	2	6	4	4	4	4	6	2	9	5	3	7	2	3	4	9	2	4	9	5	5	2
Total PW		21	4	4	4	2	6	4	4	4	4	6	2	20	5	3	10	2	3	4	22	2	4	30	5	5	2

For a link to the full-sized graph [click here](#). This graph shows which ST corresponds to which UCs. In addition, the priority weight total for each UC can be found at the bottom of the graph.

3.3.4 Full-Dressed Description

Use Case UC-1:	CreateAccount
Related Requirements:	ST-1, ST-6, ST-9
Initiating Actor:	User
Actor's Goal:	To create an account using an email, or existing social account.
Participating Actors:	System, DataBase
Preconditions:	<ul style="list-style-type: none"> • User has downloaded the InvestME application. • There is no user account already signed-in. • The system displays a menu for available functions; at the initial main menu, the choices are "Sign-In" or "Create new account."
Postconditions:	<ul style="list-style-type: none"> • A new account is successfully created. • A badge is given to the user for completing the "Create Account" achievement.
Flow of Events for Main Success Scenario:	
→	1. User downloads the InvestME application, and creates a new account
→	2. User (a) chooses to create a new account with existing email, or (b) uses an existing social media account
→	3. User chooses a password for the new account
←	4. CreateAccount (a) validates the users input and creates a new account, (b) saves the account to the cloud by calling SaveData , and (c) gives the user an achievement by calling GiveBadge
→	5. User successfully logs in with their account credentials, and begins using the application
Flow of Events for Extensions (Alternate Scenarios):	
2a. User enters an invalid email, or social media account	
←	1. CreateAccount (a) detects error, (b) signals to the actor
3a. User enters an invalid password	
←	1. CreateAccount (a) detects error, (b) signals to the actor

Use Case UC-20:	CompareExpenditure
Related Requirements:	ST-9, ST-14, ST-18
Initiating Actor:	User
Actor's Goal:	To compare expenditures in a specified timeframe with Stocks, also in a specified timeframe.
Participating Actors:	System, DataBase
Preconditions:	<ul style="list-style-type: none"> • Users logged their expenditures into InvestME. • SaveData has saved all logged expenditures. • The system displays a menu for the available functions; ShowCompareExpenditureTutorial, and CompareExpenditure.
Postconditions:	<ul style="list-style-type: none"> • CompareExpenditure has displayed a table of user expenditures being compared to stocks in the specified timeframe. • A badge is given to the user for completing the "Comparison" achievement.
Flow of Events for Main Success Scenario:	
→	1. User navigates to the menu displaying ShowCompareExpenditureTutorial , and CompareExpenditure
→	2. User selects CompareExpenditure
→	3. User enters a timeframe to view the comparison
←	4. CompareExpenditure (a) checks the user logs in SaveData (b) calls data from ViewMarketData , and (c) gives the user an achievement by calling GiveBadge
←	5. CompareExpenditure successfully displays a table showing the comparison between logged expenditures and stocks within the specified timeframe
Flow of Events for Extensions (Alternate Scenarios):	
3a. User enters an invalid timeframe	
←	1. CompareExpenditure (a) detects error, (b) signals to the actor
4a. CompareExpenditure fails to retrieve user logs from SaveData , or data from ViewMarketData	
←	1. CompareExpenditure (a) detects error, (b) signals to the actor, (c) refreshes, and attempts to retrieve data again

Use Case UC-23:	ViewPotentialEarnings
Related Requirements:	ST-9, ST-14, ST-21
Initiating Actor:	User
Actor's Goal:	To view potential earnings in a specified timeframe.
Participating Actors:	System, DataBase
Preconditions:	<ul style="list-style-type: none"> • User logged their expenditures into InvestME. • SaveData has saved all logged expenditures. • The system displays the available function, ViewPotentialEarnings.
Postconditions:	<ul style="list-style-type: none"> • ViewPotentialEarnings displays the dollar amount of potential financial earnings the user could have made had they invested their money into stocks. • A badge is given to the user for completing the "Potential Earnings" achievement.
Flow of Events for Main Success Scenario:	
→	
1. User navigates to the function, ViewPotentialEarnings	
→	
2. User selects ViewPotentialEarnings	
→	
3. User enters the timeframe they wish to view	
←	
4. ViewPotentialEarnings (a) checks the user logs in SaveData (b) calls data from ViewMarketData , and (c) gives the user an achievement by calling GiveBadge	
←	
5. ViewPotentialEarnings successfully displays a summary of how much the user could have earned had they invested their money into stocks	
Flow of Events for Extensions (Alternate Scenarios):	
3a. User enters an invalid timeframe	
←	
1. CompareExpenditure (a) detects error, (b) signals to the actor	
4a. ViewPotentialEarnings fails to retrieve user logs from SaveData , or data from ViewMarketData	
←	
1. ViewPotentialEarnings (a) detects error, (b) signals to the actor, (c) refreshes, and attempts to retrieve data again	

3.4 System Sequence Diagram

The following sequence diagrams describe the relationships between key actors and the InvestME app. The user initiates the sequence by signing up for an account via their mobile device or via a web browser.

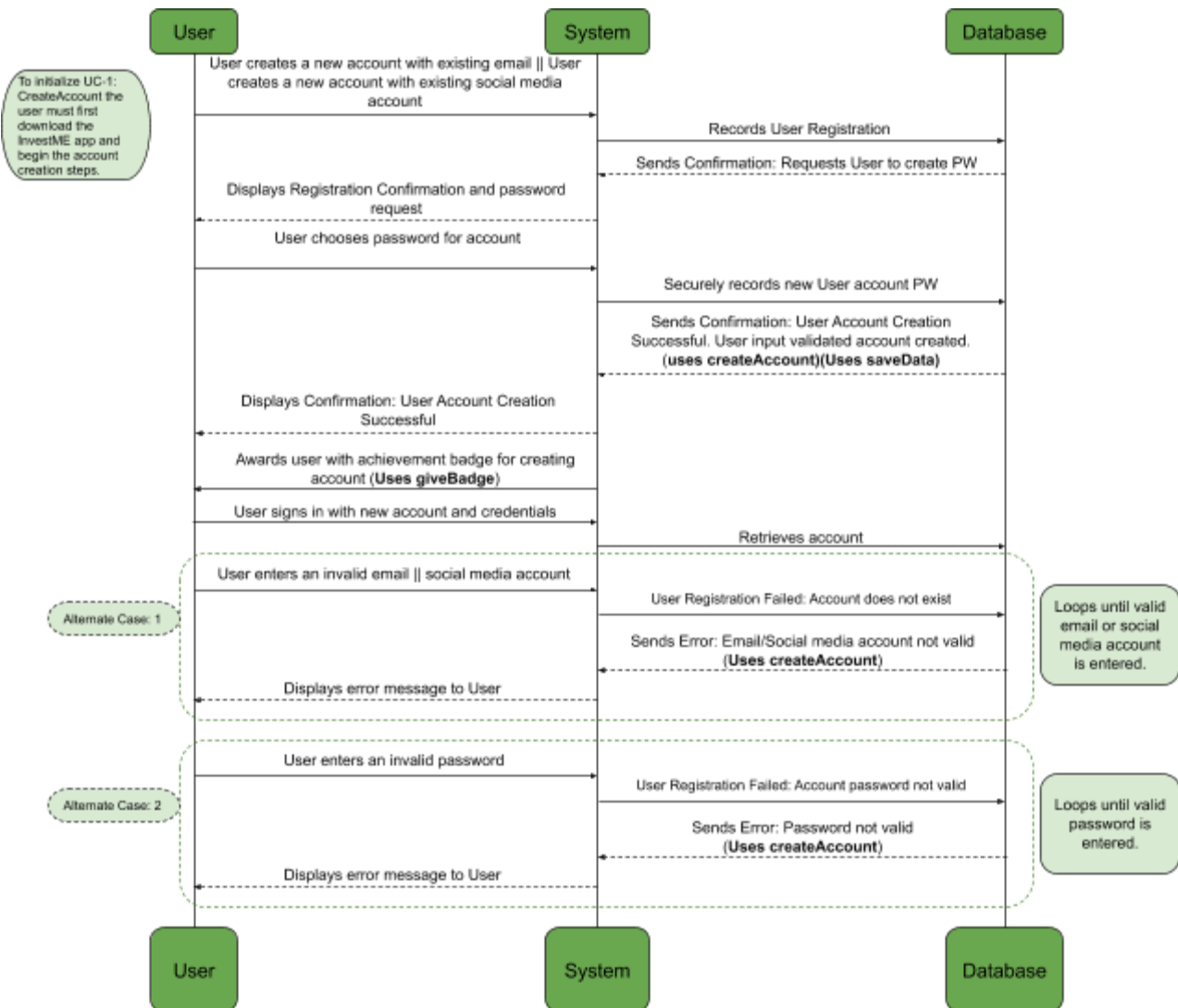


Figure 3.4.1: See UC-1: CreateAccount. When the user starts the request from a mobile device or through a web browser, they will be led to register for the InvestME account. It is necessary to create or register for an InvestME account in order to use its features. The system will take the user input data and send it to the database. The database checks for a valid email address or social media account, and sends a confirmation or failure notification to the system. The system presents the message to the user.

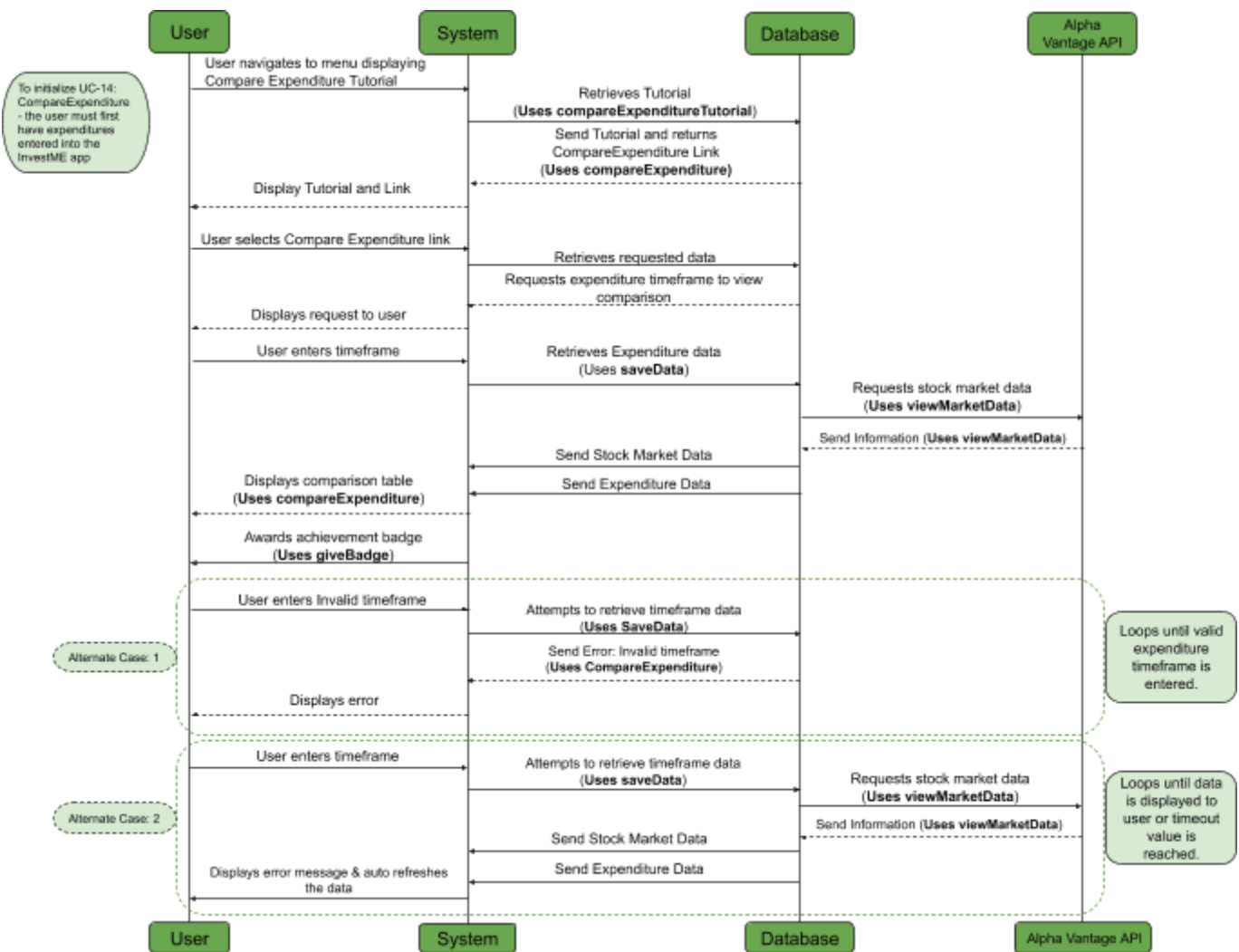


Figure 3.4.2: See UC-14: CompareExpenditure. When the user navigates to the Compare Expenditure link, this use case is initiated. The user indicates the required timeframe for the system. The system sends the query to the database and requests Alpha Vantage API stock market information. The system provides a comparative table to the user once the requested information is collected. The customer will obtain a achievement badge for market data comparison.

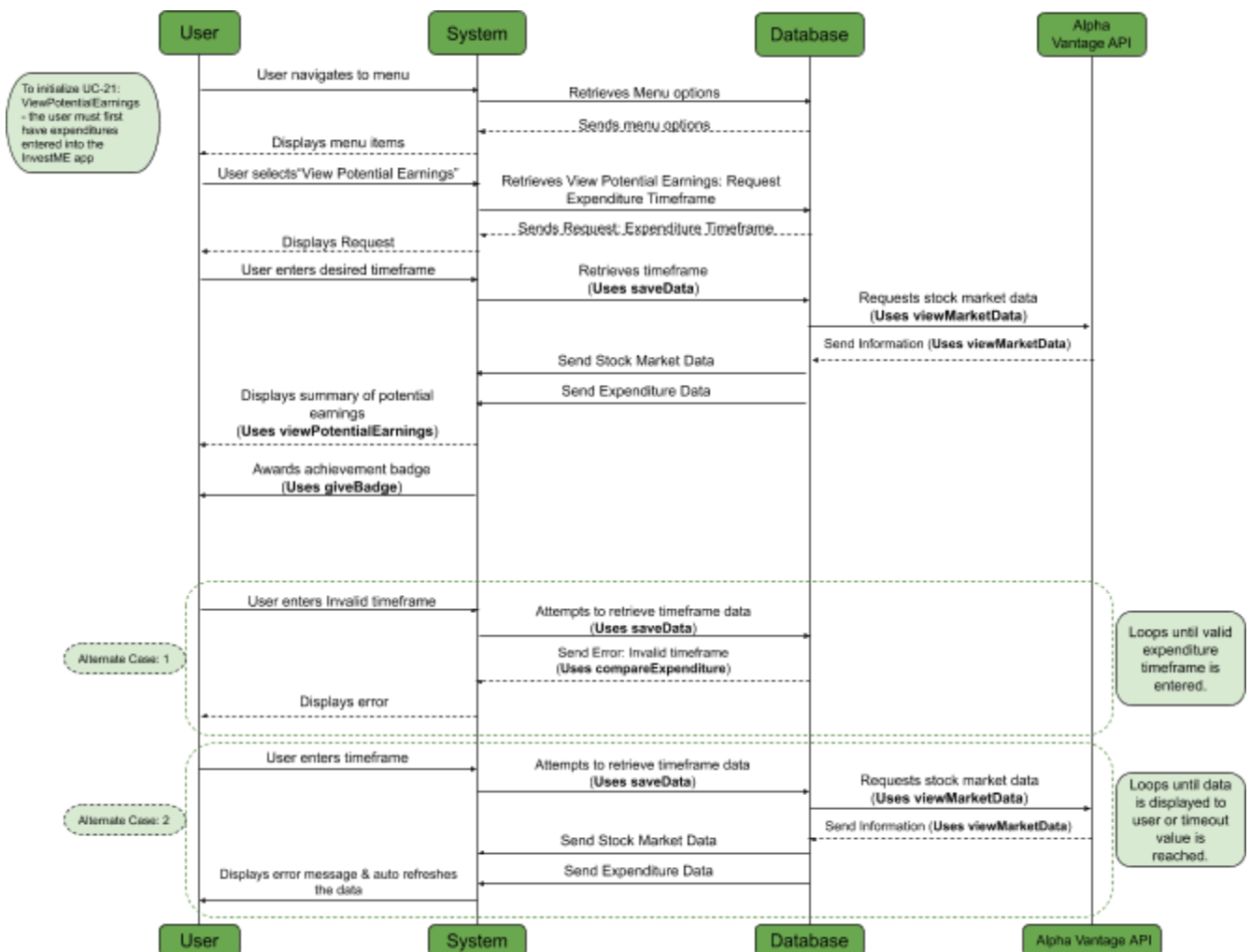


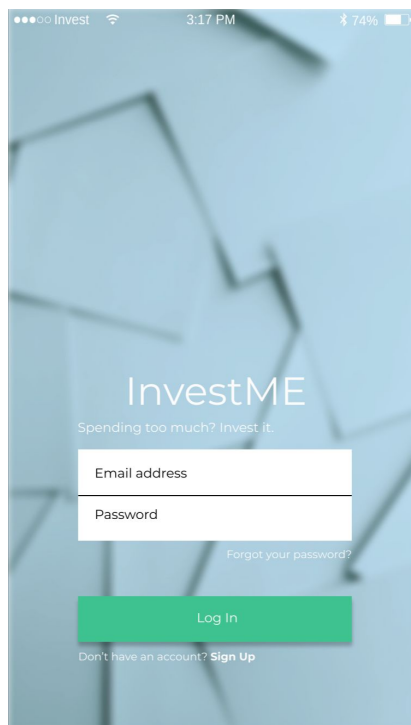
Figure 3.4.3: See UC-21: ViewPotentialEarnings. When the user navigates to the View Potential Earnings link, this use case is initiated. The user indicates the required timeframe for the system. The system sends the query to the database and requests Alpha Vantage API stock market information. The system provides a comparison between the logged expenditures and the stocks within the specified timeframe. The customer will obtain a achievement badge for completing the View Potential Earnings task.

User Interface Specification

4.1 Preliminary Design

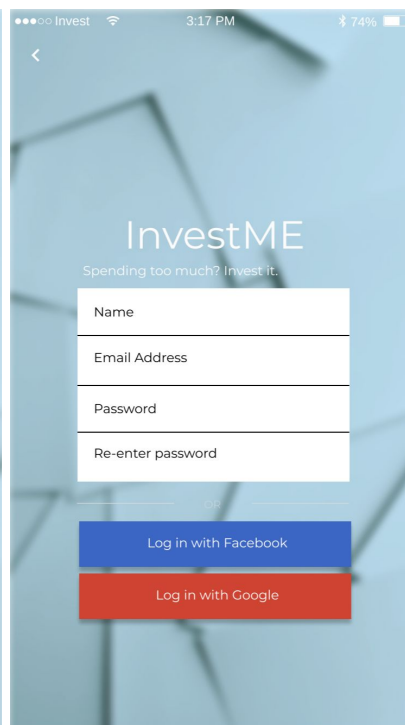
The preliminary design section showcases the many pages of the app. These pages are in chronological order to show how and explain how users enter and what each button, clickable area, and input area does. The navigational paths are as follows below and are can be seen specifically in the menu slider page.

1. Log-in Page



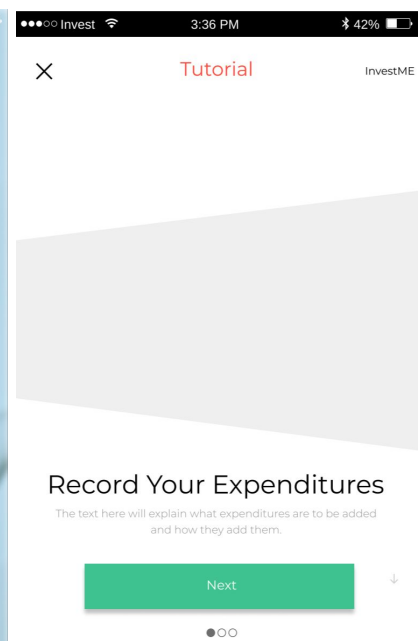
Allows users to login to InvestME. Here there will be 2 input fields and 3 clickable areas. The 'Email Address' and 'Password' sections are the input fields, and if you click on 'Forgot your password?' you will be linked to a page where you will be able to use your email to reset your password. If you click, 'Log In' you will be

2. Sign-up Page



Allows new users to create an account with InvestME. There are 4 input fields and 2 clickable buttons. Here they can choose to use their personal email addresses to sign-in. This will need to be confirmed upon verification sent to the email the user signed up with. Alternatively, they can choose to login with their Facebook or Google

3. Introductory Tutorial



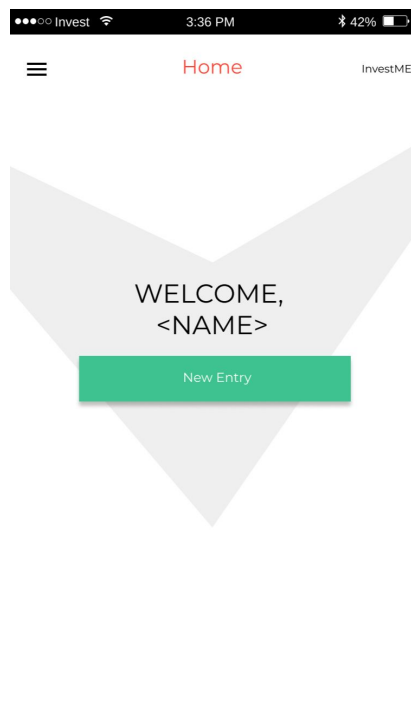
Allows new users to understand in 3 slides what InvestME is and how to use it. Using a slider we can move from page to page as the 3 circles at towards the bottom of the page indicate which page you are on. The next button will provide a way to move to the next page, however, users will also be able to swipe right to also do

logged into InvestMe. Lastly, if you click, 'Sign Up' you will be directed to a page allowing you to do so.

accounts.

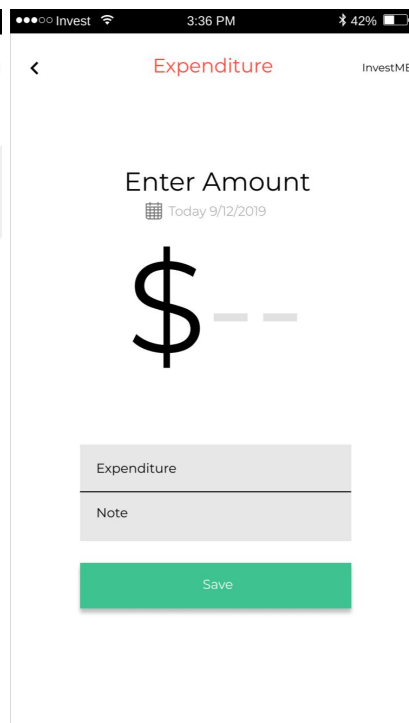
so. The cross in the top right allows the user to exit the tutorial.

4. Home Page



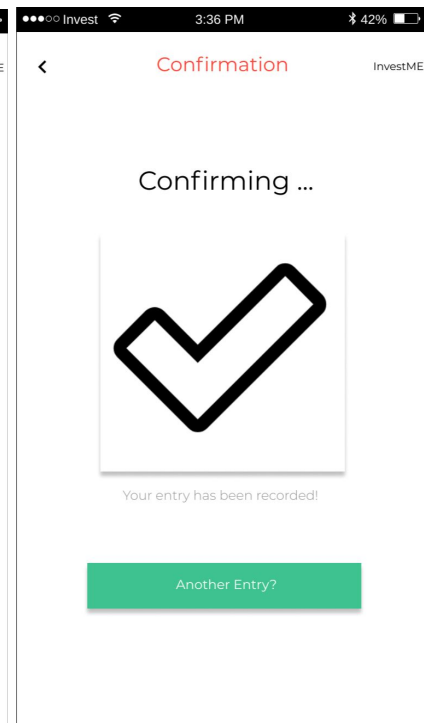
Allows users to create a new entry by clicking the, 'New Entry' button. The only other clickable area on this page is the hamburger icon. The hamburger when pressed opens the menu slider to easily navigate around InvestME.

5. New Entry Page



Allows users to create a new entry. There are 2 input fields and 3 clickable areas. The 'Today <today's date>' section is a clickable area that defaults to the current date, but also can be clicked and changed if the user would like input a past or future entry. The calendar within the app will be able to do this as well, but for ease, the user is able to do this here as well. The 'Expenditure' input area allows the user to name the

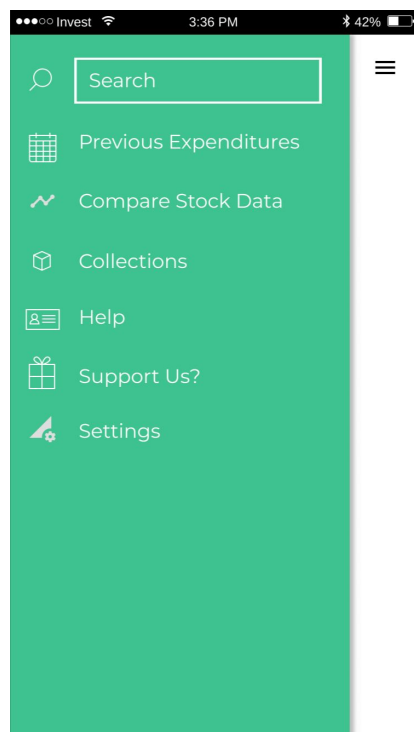
6. Confirmation Page



Allows users a way to wait for the entry to be saved if necessary. There is one clickable button. This page will also prompt the user if they want to add another entry by clicking the, 'Another Entry' button. The right angle bracket allows the user to go back to the previous page when clicked.

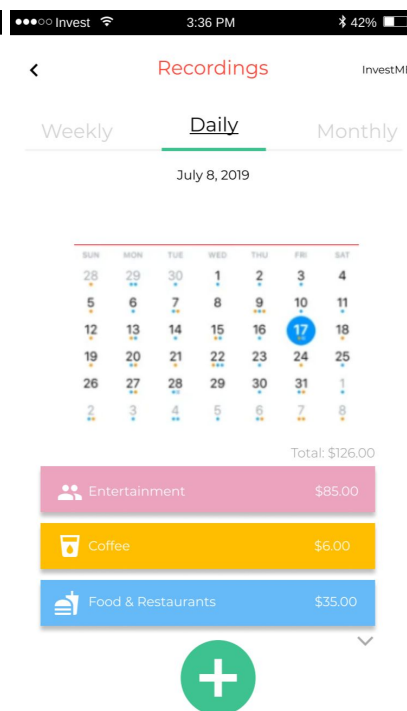
expenditure, while the note can be any relevant details or a more detailed description. The save button will save the expenditure. The right angle bracket allows the user to go back to the previous page when clicked.

7. Menu Slider Page



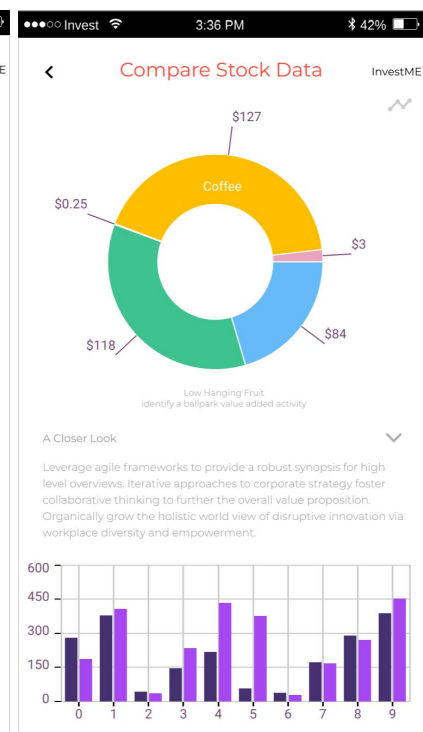
Allows users to easily navigate around InvestME. There are several clickable areas that will take the user to the appropriate page when clicked, e.g. clicking the, 'Previous Expenditures' will take the user to their recorded entries. If the user swipes left on the menu slider, the page will show whatever page the user was on prior to clicking the hamburger button.

8. Recordings



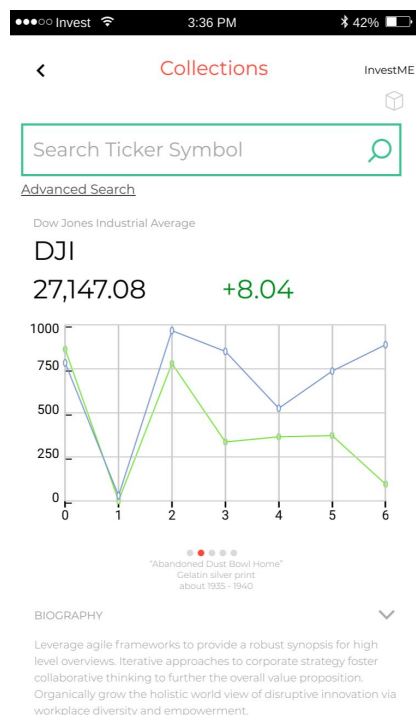
Allows users to view their recordings when they click, 'Previous Expenditures' in the menu slider. Here the users will be able to see all previous expenditures for any time frame. Additionally the user will have the ability to revise and add an entry here for ease. The right angle bracket allows the user to go back to the previous page when clicked.

9. Compare Stock Data Page



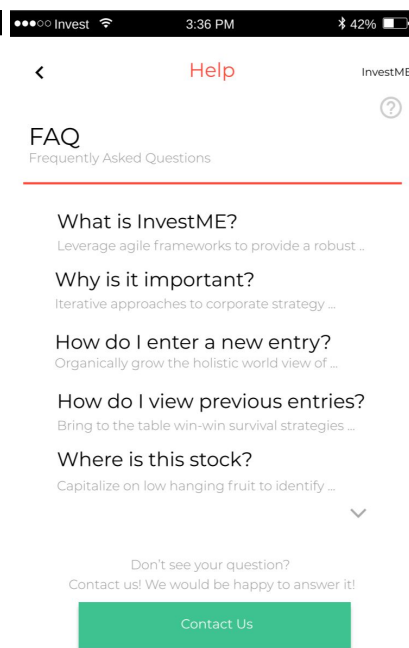
Allows users a way to compare their previous expenditures to different stocks. This page will contain diagrams and graphs to help explain this data. Additionally the paragraph of text will give more detailed information. The right angle bracket allows the user to go back to the previous page when clicked.

10. Collections Page



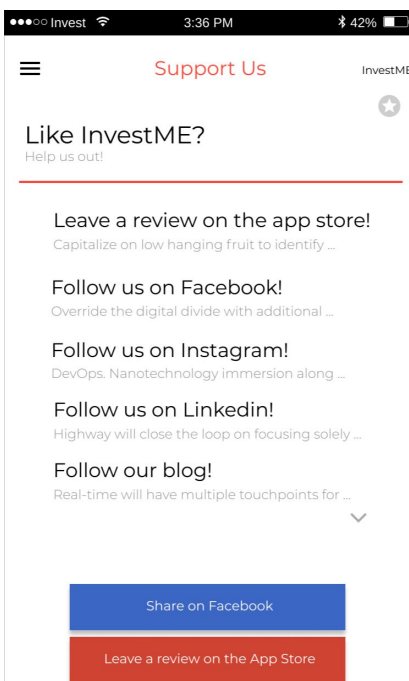
Allows users to easily search for a ticker symbol or global equity to find more information about that stock. There is 1 input area and 2 clickable areas. The box with the text, 'Search Ticker Symbol' will allow users to search for their desired symbol and gain more information. The advanced search clickable area will bring down a menu to filter the query. The right angle bracket allows the user to go back to the previous page when clicked.

11. Help/FAQ Page



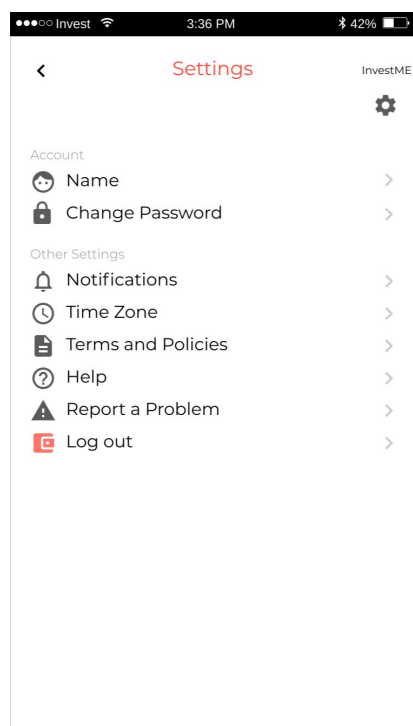
Allows users to view frequently asked questions and answers, and if necessary a way to contact the developers. The only clickable button will redirect them to email the developers at InvestME email account. The right angle bracket allows the user to go back to the previous page when clicked.

12. Support Us Page



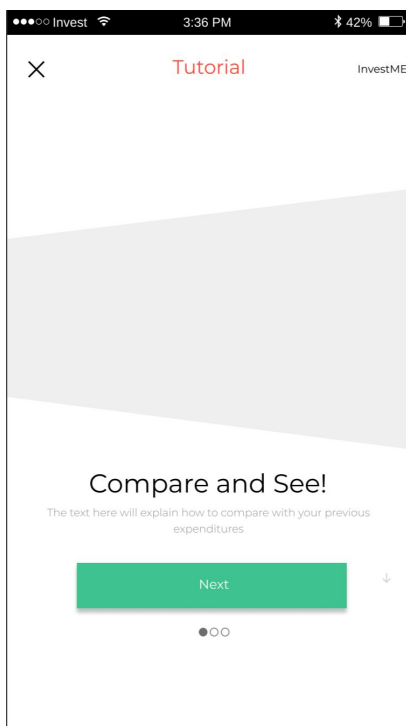
Allows users to help the developers gain a better following with this free-to-use app. Here all the information given is links to social media and other ways to assist the developers. The two buttons will allow the users to easily share InvestME on Facebook or review the InvestME on the app store. The right angle bracket allows the user to go back to the previous page when clicked.

13. Settings Page



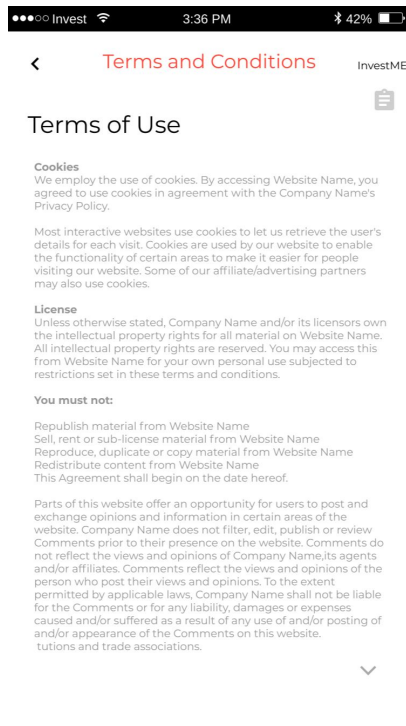
Allows users to access the settings within InvestME. The various settings will slide to the right to easily change and update. The right angle bracket allows the user to go back to the previous page when clicked.

14. Tutorial Page (opt.)



Allows new users to understand in 3 slides how to historical data. Using a slider we can move from page to page as the 3 circles at towards the bottom of the page indicate which page you are on. The next button will provide a way to move to the next page, however, users will also be able to swipe right to also do so. The cross in the top right allows the user to exit the tutorial.

15. Terms and Conditions



Allows users to view the terms and conditions of the app. The right angle bracket allows the user to go back to the previous page when clicked. The reverse chevron allows the user to view more. The right angle bracket allows the user to go back to the previous page when clicked.

4.2 User Effort Estimation

4.2.1 Recording a New Expenditure

This scenario represents recording a new expenditure (and saving it).

Navigation: Total of 3 taps, as follows

- a. ... Press “Log in with Google”
- b. ... Press “New Entry”
- c. ... Press “Save”

Data Entry: Total of 8 taps, and 0 swipes as follows

- a. ... Type “1” “5” to add a \$15 expenditure
- b. ... Type “Coffee” under note

4.2.2 Comparing Expenditure

This scenario represents comparing expenditures with stock market data.

Navigation: Total of 3 taps, as follows

- a. ... Press “Log in with Google”
- b. ... Press the “Menu” icon
- c. ... Press “Compare Stock Data”

Data Entry: Total of 0 taps, and 0 swipes as follows

No data entry is required for this particular case.

4.2.3 Signing up for an InvestME account

This scenario represents signing up for an InvestME account.

Navigation: Total of 1 tap, as follows

- a. ... Press “Sign up”

Data Entry: Total of 5 taps, and 48 keystrokes as follows (Contingent on user’s input)

- a. ... Click cursor to “Name”
- b. ... Type “J” “o” “h” “n” “ “ “S” “m” “i” “t” “h”
- c. ... Click “Email Address”
- d. ... Type “J” “o” “h” “n” “S” “m” “i” “t” “h” “@” “a” “c” “m” “e” “.” “c” “o” “m”
- e. ... Click “Password”
- f. ... Type “m” “y” “p” “a” “s” “s” “w” “o” “r” “d”
- g. ... Click “Re-enter Password”
- h. ... Type “m” “y” “p” “a” “s” “s” “w” “o” “r” “d”
- i. ... Click “Submit”