

# 354TheStars Online Marketplace

## FINAL REPORT

Version: 1.0



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# **1. Introduction**

This section of the Report will elucidate the purpose of the document, the scope of the project and provide an overview of its organization.

## **1.1. Purpose**

The final report is an updated agglomeration of all our documentation work. This includes the Software Requirement Specification and the Software Design Document. It outlines the requirements and features that we had to implement for the software, how it was implemented and the result of our development and testing. The objective was to develop an e-commerce website called 354TheStars. This report is a reference document for users, stakeholders and developers who have a need or have an interest in understanding what the software does and how we achieved these results.

## **1.2. Scope**

354TheStars is an online marketplace where users can buy and sell products. Its objective is to simplify the interaction between the buyer and the seller while maintaining an efficient and profitable model. The platform's objective is to increase its market share and, by extension, expand platform profitability. The system currently takes an eight percent fee per transaction completed on our platform. However, new sellers will only be charged three percent for their first ten transactions. In return, we aim to provide users with a secure, dependable and accessible system.

## **1.3. Overview**

This document will provide an in-depth description of the updated functional and non-functional requirements acquired throughout the various stages of development. It will further outline the design and the tools used for every subsystem of the program. Besides this, the document provides a long list of tests conducted, their outcomes and which requirements were met. The appendix includes a list of meetings held by the team and a mobile-port cost-benefit analysis. The main structure of the report is decomposed as follows:

- Updates to Software Requirements Specification
- Updates to Software Design Document
- Conclusion
- Appendix

## **2. Updates to Software Requirements Specification**

Throughout the last three months, 354TheStars has become an increasingly more mature platform. More ideas were solidified, and some features were added, modified or removed. This section's is to show the final software requirement specification that have been extracted from the various interviews conducted during the development cycle.

### **2.1. Product Perspective**

354TheStars is an online shopping website. However, Bob TheRich has demonstrated an interest in the creation of a mobile application to accompany the website. We have been tasked with creating a report on the cost and feasibility of developing a mobile variance. Please refer to the appropriate appendix section for more information.

### **2.2. Requirements Interviews**

Requirement elicitation is the very first step to developing any software. The requirements must be extracted from the potential users. It is often the case that the end user or client do not know what exactly they want. A good development team will be able to go and extract all the functional and non-functional requirements needed to work on the project and will provide regular feedback on the program. The most effective way to acquire information and to clarify system requirements are through interviews.

#### **Interview One**

Interview one was held on September 24th with Professor Hakim Mellah and Professor Aimana Hanna. Dr. Hanna is the agreed upon substitute for Bob TheRich, the client. Dr. Hanna introduced his initial idea and vision for the application. The structure of the interview was semi-structured. This means that a list of questions were prepared, but did not have to be followed. The interview was conducted by Michael and Steven, the coordinator and vice-coordinator respectively. From this interview we extracted the requirements elucidated in the first version of the Software Requirement Specification document.

#### **Interview Two**

Interview two was held on October 24th with Professor Hakim Mellah and Professor Dr. Hanna[11]. The interview was conducted by Michael and Steven, and was semi-structured. During the interview we discussed the appearance of some development-related issues and how we could address them. Furthermore, the client also provided some requirements changes that he would like to see reflected in the final version of the software.

### **Interview Three**

Interview three was held on November 2nd with Mr Casey, Bob TheRich's assistant. The interview was structured, and was conducted by Michael. The interview used prepared questions concerning the current prototype of the project and his feedback in regards to colour schemes and the user interface. This interview resulted in no requirement changes, but offered a lot of insight in regards to the design of the interface.

### **Interview Four**

Interview four was held on November 17th with Jacob Zigby. The interview was conducted by Steven, and was an unstructured interview. Mr. Zigby is a computer enthusiast living in Saint-Hubert and is an avid user of Amazon. Since the application is not necessarily going to be used by the client, as such, it was important to the development team to acquire an external opinion by a more conventional user. The feedback resulted in a lot of modifications to the layout of the user interface.

### **Interview Five**

Interview five was held on November 24th with John Smith. John Smith is the owner of a small local pawn shop. He often uses our competitor Kijiji to sell items online. However, Kijiji still requires the buyer to travel to the seller which can cause complications when trying to sell a product. The interview was a semi-structured interview by Michael and Steven. The objective of the interview was to receive feedback on a closed beta version of the website, and to see if someone with a use-case similar to John's would use the application. No requirements changes were made. Optimization for non-chromium web browsers was suggested.

#### **2.2.1. User Stories and Personas**

This section covers the updates to user stories and the personas interested in our website.

Table 2.1.: User Stories.

<b>As a/an</b>	<b>I want to...</b>	<b>so that...</b>
buyer	refine search using filters	I can easily find the products that interest me.
admin	check that no free products are posted	I can guarantee the owner's profitability.
owner	charge 3% commission on the first ten products sold and then 8% on the rest	I encourage new sellers to join the market.
owner	get activity reports including the number of items sold listed by top sellers	I can base my managerial decisions on these reports.

Personas represent the different user types that might use the service, product, site, or brand in a similar way. A list of personas is shown in **Table 2.2**.

Table 2.2.: List of Personas.

Persona Group	Name	Demographics	Goals and Tasks	Technical Experience
Buyer	Mark Drew	Mark is a 25-year old Canadian male, photographer.	Mark would like to look online to easily find some tech gear that interests him. In addition to searching by text, he wants to filter the results using different search filters.	Mark does most of his shopping online.
Top Seller	Cally Dolan	Cally is 42-year old Canadian, businesswoman.	Cally believes that the secret behind her success in online sales is customer satisfaction. Cally wants to be able to reply to every review that she gets to make sure that every single customer is satisfied.	Cally has worked in the online sales market for more than seven years.
Owner	Bob TheRich	Male	Mr. TheRich likes to make decisions based on complex statistics. He wants to see activity reports like the number of items sold listed by top sellers to understand his business fully.	He has no background or expertise in software engineering.

## 2.3. External Interface Requirements

This section outlines all the external requirements of the interfaces needed for the software to execute properly.

### 2.3.1. User Interfaces

One of the main design principles that we will be following when designing the software's user interface is "Material Design". This design is a UI standard that was introduced by Google in 2014 with the intent of unifying UI design across its own devices and web services.[2] Nowadays, it has been adopted by a multitude of sites in the industry as a way of standardizing user interfaces across both the web and different display form factors.

This design divides each UI element into "cards" that contain several features to enhance the user experience. One such feature is that these cards should retain their overall appearance regardless of which device you use the software. So, for instance, using a piece of software on a desktop computer with a 16:9 aspect ratio monitor should be roughly the same experience as using the software on a mobile device that has much less screen real estate. The standard ensures that responsible cross-platform design is a key component of your site and is as easy to implement as possible, which is important when you factor in the continuously growing number of users who use smaller form factor devices to browse and consume online media.

Another advantage of Material Design is the feedback of using its feature set. One of the key components to having a good user interface design is the satisfaction or "feedback" that a user receives when interacting with it. We could implement this as a nice tactile bump on a physical switch, the responsiveness of a scroll bar, or even trivial things such as having drop-shadows on the text. All these elements, while they may not be apparent, do affect the user experience and make it better, or more accurately worsen the experience when lack thereof is apparent.

Because of this, Material Design intelligently makes use of a lot of features that although do not affect the functionality of the software, do enhance the user feedback. One of these features is its use of light and shadows to simulate depth on interface elements. In the real world, lighting makes up a big part of how humans can figure out the depth of physical material. Thus, you can add drop-shadows to “forefront” elements of the UI to make them appear closer, even though that is an illusion created in our head. Minor design considerations such as this improve both the look and feel of a user interface.

On the functional side of things, Material Design encourages the use of minimalist icons to interact with the user. While this can lead to an overall cleaner design, it can also hinder a user’s ability to understand how to operate your software, especially if they are unfamiliar with its genre. To combat this, any interact-able pieces of the software will require tool-tips. These are short pieces of text that will appear over hovered elements in the UI, which can explain the functionality and consequences of interacting with said element. The goal is for these tool-tips is to be as informative and concise as possible. The result is an interface with a clean aesthetic that can also provide information to less savvy users.

These benefits, along with its set of standardized open-source UI templates and its standardization in the industry, make Material Design the gold standard that this software will follow to ensure the responsiveness and appeal of our interface.

### **2.3.2. Hardware Interfaces**

Since the interface of the software is primarily web-based, the client will need to have internet-enabled hardware. The specific internet functionality needed will be outlined in Section 3.4 (Communications Interfaces). The input mechanism from the client will be a combination of mouse and keyboard usage, although touchscreen functionality is also available for mobile users. Feedback for these inputs and the web-page itself will output to a screen connected to the computer. The connection of all the I/O mentioned to the client’s computer itself is beyond the scope of this software and is up to the client to configure properly.

On the server’s end, our database will be connected to an always-on computer so that clients can access information such as their account details at any time. Information that needs saving between client sessions (product info, client account details, among other things) will be readily available and remembered in the database’s storage. Like our clients, this server also needs to have internet access for the web server to query user requests and send out emails.

### **2.3.3. Software Interfaces**

We will write the front end of our software in HTML. We will use JavaScript as its client-side scripting language alongside CSS for markup styling. All three of these tools are ubiquitous in web development, so there is little reason not to apply them to our software.

The hosting of the server-side of our software will be on a Linux-based machine, which will be running an SQL database. SQL enables the server to query the database quickly and is a veteran standard of the server industry. We will interact with this database using the Python programming language.

Below is a list of all the additional libraries and tools that we will be using for the development of this software. Each row contains the name and version of that tool, as well as a brief

description of its functionality and its benefit to the development of our software.

Table 2.3.: Software, Libraries and API used.

Name and Version	Description
Vuetify 2.0.19	UI components library based on the “Material Design” standard mentioned in Section 3.1. It provides a suite of components that enable fast and efficient production of the software’s front-end.[3]
ECMAScript 2015	The sixth edition of a standard for the JavaScript scripting languages used in universally all modern browsers. Due to its universal support, it allows the software to function on as many web browsers as possible.[8]
Flask 1.1.1	Python-based framework for developing a web application’s backend. Enables the software to display dynamic web pages that change in response to user input.[4] For example, displaying the account information of a logged-in user whose content will differ from that of a different user.
Apache 2.4.41	One of the most commonly used web server tools on the world wide web. Used to serve web pages to clients whenever they connect to your site.[5]
Gunicorn 19.9.0	Acts as an interface between our web server and the web framework. Forwards user requests from the web server to our Python framework.[6]
SQLAlchemy	An SQL toolkit for the Python language which allows the web framework to communicate with the SQL database.[12]
JSON	File format for storing data in plain-text. Its ubiquity in web services enables us to store client information in our database under this format easily and to parse it into dynamic web pages quickly.[9]

#### 2.3.4. Communications Interfaces

The primary communication interface of the software will be HTTPS over the world wide web as a means of transferring data between the client and server (sending web pages to the client, a seller adding new products to their catalogue, etc.). Currently, the only data that we will transfer between these two services are JSON objects, which, as mentioned in the preceding section, contain all the dynamic content to be displayed on the web site (account details, updated product info, etc.).

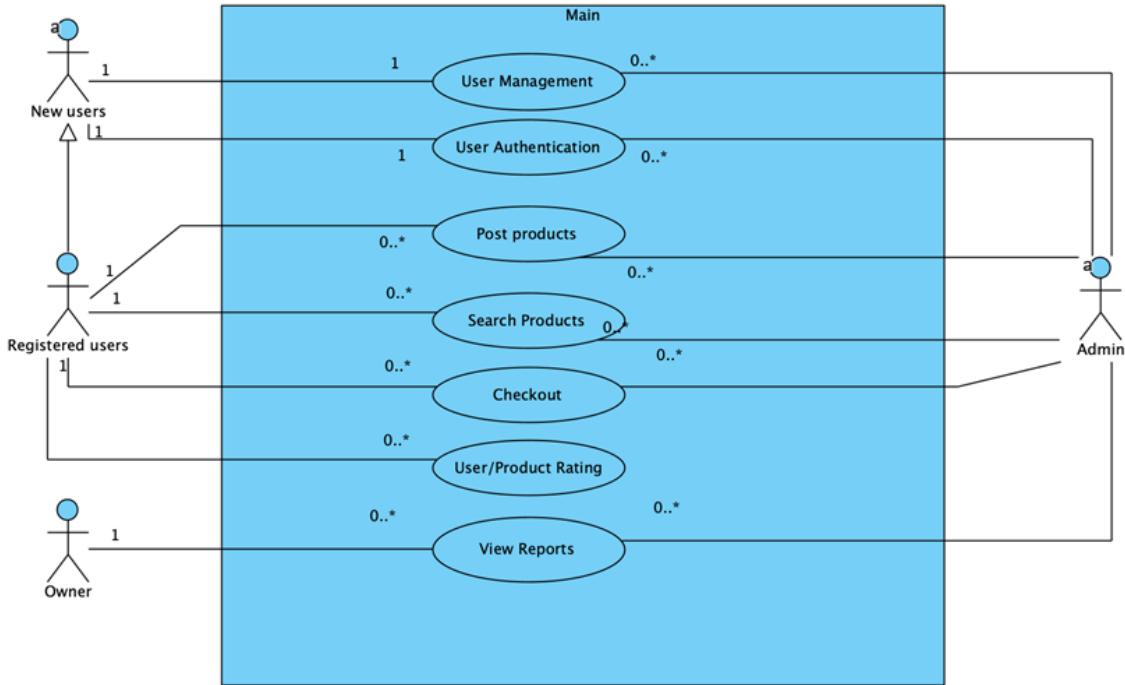
We will also utilize emails. Each user is required to have a unique email address attached to their account, so our software will be required to send the user emails for purposes such as verifying their registration, the sending of receipts when they purchase a product, among other things.

## 2.4. System Features

This section is an updated version of the System Requirement Specification System Features. All functional and non-functional requirements will be shown below. This section will only provide the system requirements that were agreed upon for the final version of the program. All removed features will be omitted, but the feature id of subsequent features will not be decre-

mented, because it maintains consistency with previous iterations of the document.

Figure 2.1.: Main Use Case Diagram



#### 2.4.1. Account Creation

Account creation is the feature the encompasses the process by which users will interact with the system to register themselves onto the platform, which will create a user profile that users will use for the purchase and sale of items.

Figure 2.2.: Account Registration Use Case Diagram

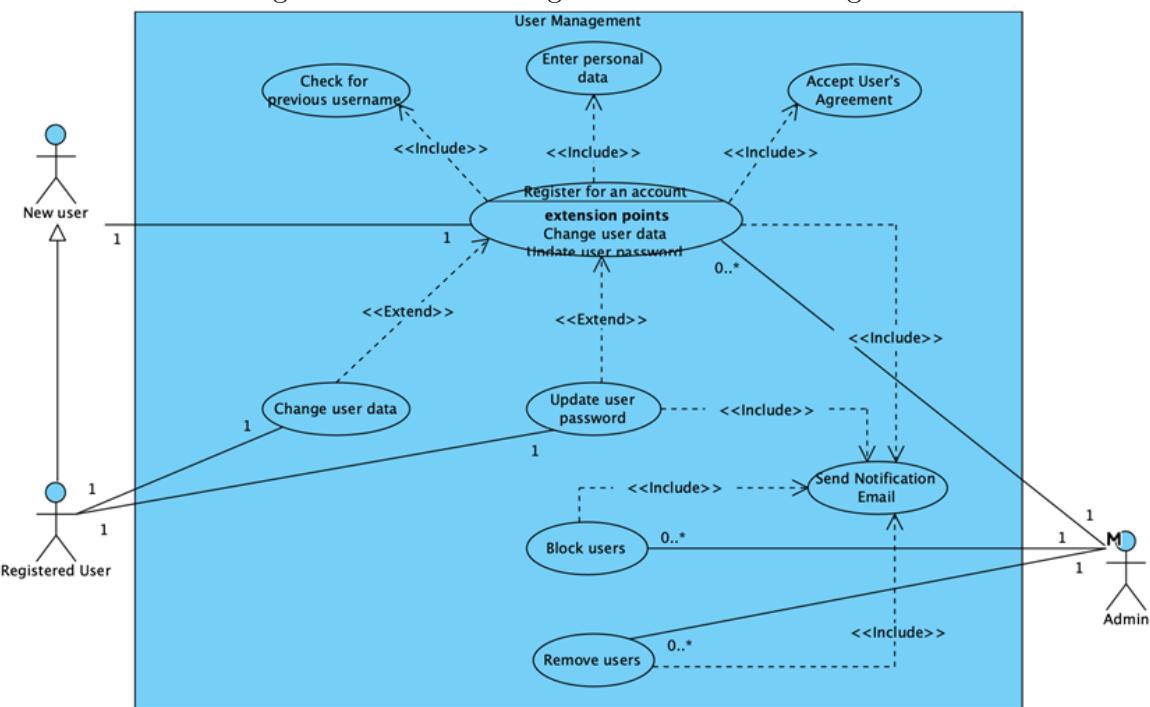


Table 2.4.: Account Creation Functional Requirements (FR-ACS)[11].

Feature ID	Feature Name	Description
FR-ACS1	Validate Email Address	Verify that the email address follows the [WORDS]@[WORDS].[WORDS] sequence of characters.
FR-ACS2	Validate Password	Verify that the entered passwords contain at least one upper case, one special character and a minimum length of eight characters. The password is encrypted and then saved in the database.
FR-ACS3	Emit Confirmation Email	The application will emit a confirmation email upon the creation of the account.
FR-ACS4	Register Account	The application shall allow a user to create an account from the login or register pages on the website.

#### 2.4.2. Profile Management

Profile Management is an agglomeration of user management requirements. It consists of everything from changing account email address or shipping address to browsing the user transaction history or viewing current listings.

Table 2.5.: Profile Management Functional Requirements (FR-PM1)[11].

Feature ID	Feature Name	Description
FR-PM1	Change Email Address	The application shall allow the user to change the email address of their profile.
FR-PM2	Change Password	The application shall allow the user to change the password of their account.
FR-PM3	Add Shipping Address(es)	The application shall allow a user to add up to three different shipping addresses.
FR-PM4	Remove Shipping Address(es)	The application shall allow a user to remove a shipping address from their profile.
FR-PM5	Edit Shipping Address(es)	The application shall allow a user to edit a shipping address in their profile.
FR-PM8	Edit Phone Number	The application shall allow a user to modify their profile phone number.
FR-PM9	View Transaction History	The application shall allow a user to see a list of all completed and pending transactions.
FR-PM11	View Product Listings	The application shall allow a user to access a list of all active and completed listings.
FR-PM12	View Ratings	The application shall allow a user to view their current seller ratings.
FR-PM13	View Reviews	The application shall allow a user to view a list of all the reviews they have registered.
FR-PM14	View Order Status	The application shall allow a user to display the status of all their pending orders.
FR-PM15	Change Order Status	The application shall allow a seller to change the status of their pending orders. For example, the seller will be able to notify the buyer when the item has shipped.

#### 2.4.3. Account Recovery

When a user tries to log in, they will have the option: “I Forgot My Password” that will send an email containing a temporary password to the user. The password can be used by the user to recover the account.

Table 2.6.: Account Recovery Functional Requirements (FR-AR)[11].

Feature ID	Feature Name	Description
FR-AR1	Recover Password	The application shall allow a user to recover their profile password.
FR-AR2	Send Temporary Password	The system shall change the user profile password to a temporary password that it will send to the user via email.

#### 2.4.4. Login

Users may browse the store as a guest or log in to purchase products on the marketplace. To login, the user must first have created an account profile. The login feature grants the client

user-level privileges. User-level privileges come with various benefits, such as the ability to check out or save products to their cart. An administrator is counted as a regular login, however, possesses special flags can provide the user with special privileges.

Figure 2.3.: Login Use Case Diagram

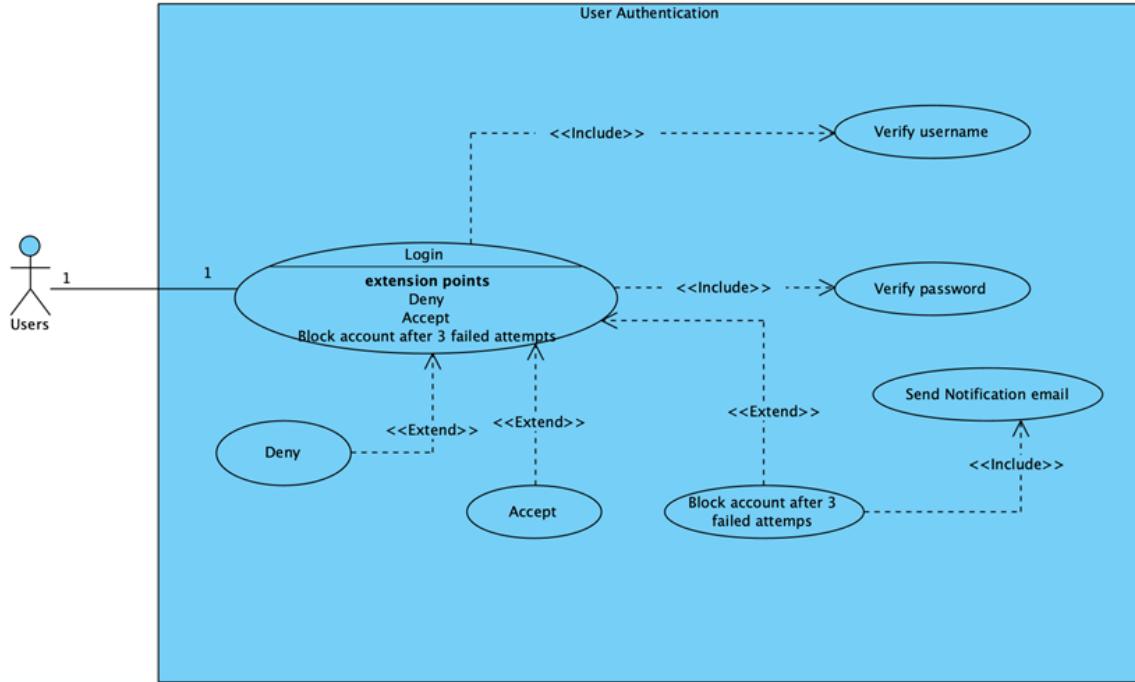


Table 2.7.: Login System Functional Requirements (FR-LOG).[11].

Feature ID	Feature Name	Description
FR-LOG1	Login User	The application shall allow a user to login using their profile credentials either at the main page or while browsing the shop. At the end of the session a user can logout.

#### 2.4.5. Shopping Cart

The shopping cart is an essential feature that keeps track of all the items a user wants to purchase while they are browsing the marketplace. Users can also save their shopping cart to their profile as a watch-list.

Table 2.8.: Shopping Cart Functional Requirements (FR-SC).[11].

Feature ID	Feature Name	Description
FR-SC1	Add Product Listing(s)	The application shall allow a user to add product listings to their shopping cart.
FR-SC2	Remove Product Listing(s)	The application shall allow a user to remove a product listing from their shopping cart.
FR-SC3	Update Quantity	The application shall allow a user to update the number of items they are purchasing from product listings in the shopping cart.
FR-SC4	Save Cart	The application shall allow a user to save their shopping cart to their profile.

#### 2.4.6. Purchase System

The purchase system is the agglomeration of tools and requirements from checkout to payment processing and issuing a notice to the seller and buyer if an object sells. Payment processing is handled using the third-party software, PayPal.

Figure 2.4.: Purchase System Use Case Diagram

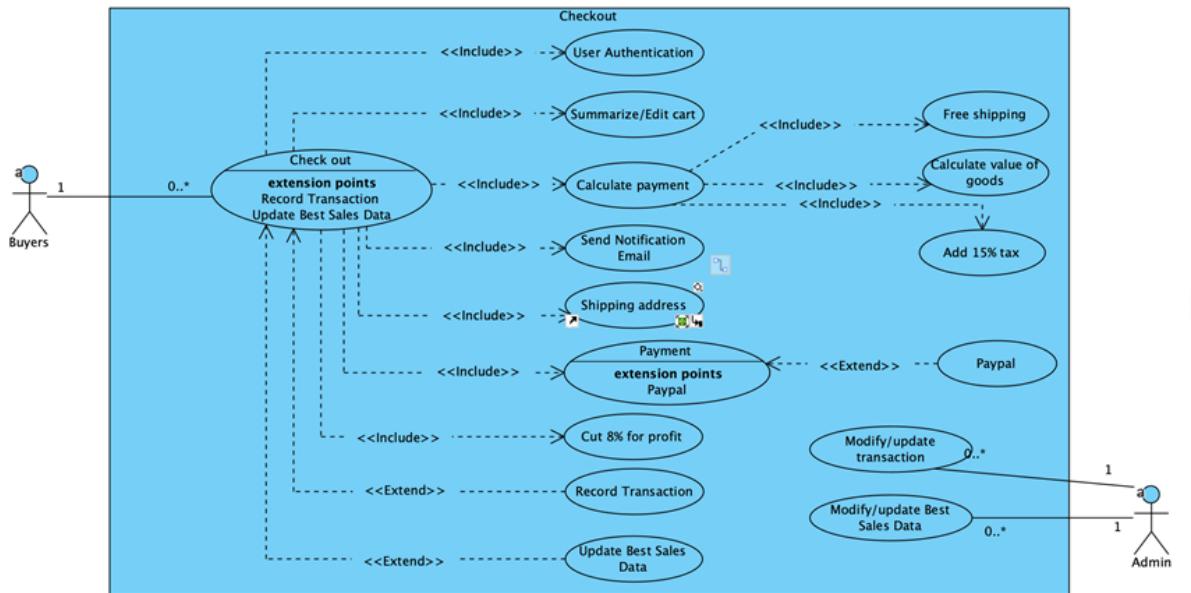


Table 2.9.: Purchase System Functional Requirements (FR-PS)[11].

Feature ID	Feature Name	Description
FR-PS1	Select Shipping Address	The application shall allow a user to select a shipping address.
FR-PS2	Select Shipping Method	The application shall allow a user to select a shipping method.
FR-PS3	Proceed to Checkout	The application shall allow a user to proceed to pay for one or more items in their shopping cart.
FR-PS4	Payment Processing	The application shall allow a user to pay online using PayPal. PayPal will also handle the authorization.
FR-PS5	Emit Notification	The system will notify the seller by email when a product sells and when a transaction is complete.
FR-PS6	Transaction Confirmation	The system shall emit a transaction confirmation to both the seller and the buyer.

#### 2.4.7. Product Listing

Product Listing is a feature that contains the information relevant to a product. It contains information such as the seller username, price, description, product images, etc. It contains all the tools and functions needed to create and view product listings.

Figure 2.5.: Product Listing Use Case Diagram

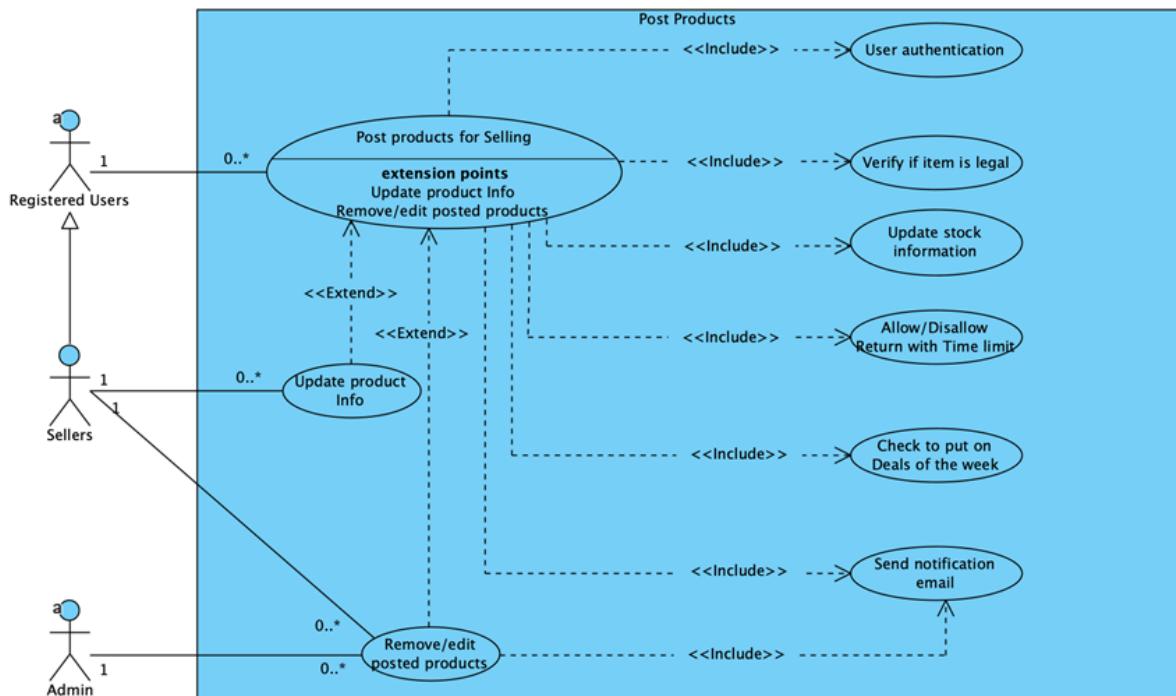


Table 2.10.: Product Listing Functional Requirements (FR-PLS)[11].

Feature ID	Feature Name	Description
FR-PLS1	Create Listing	The application shall allow users to post new product listings, free of charge.
FR-PLS2	Edit Listing	The application shall allow users to edit their current posts, which includes changing the title, description (maximum 1000 characters), price, category, and condition.
FR-PLS4	Update Quantity	The application shall allow a user to update the available quantity on a listing.
FR-PLS5	Set Condition	The application shall allow a user to set the condition of their product.
FR-PLS6	Set Category	The application shall allow a user to set the category of their listing.
FR-PLS7	Set Description	The application shall allow a user to set a description for their listing. Albeit a maximum of 1000 characters will be allowed.
FR-PLS8	Set Title	The application shall allow a user to set a title for their listing.
FR-PLS9	Upload Images	The application shall allow a user to upload images for their listing.
FR-PLS12	Delete Listing	The application shall allow a user to remove a listing.
FR-PLS13	Set Price	Set the price for the listing. Cannot be free.

#### 2.4.8. User Review

Similar to eBay, sellers will be evaluated based on their number of positive and negative reviews and given a quantitative rating. These ratings are incredibly important in determining the reliability of a seller. Nevertheless, a quantitative rating alone is not sufficient as it can be easily manipulated by “false” reviews. To this end, it is incredibly important that users can also leave comments and images to justify their positive or negative ratings. A user can only review a seller fifteen days following the purchase of a product(s). The update to the requirements introduced seller response to a product review.

Figure 2.6.: User Review Use Case Diagram (Updated)

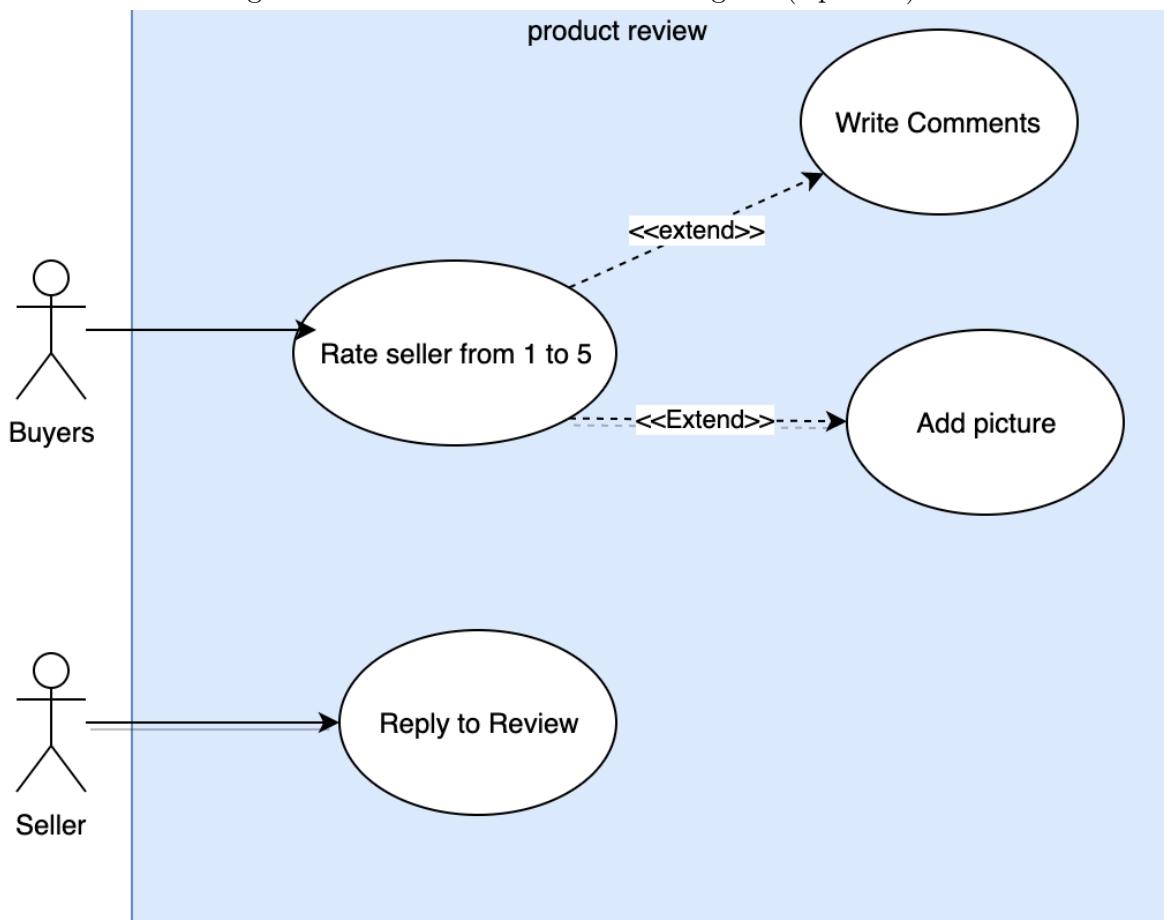


Table 2.11.: User Review Functional Requirements (FR-UR)[11].

Feature ID	Feature Name	Description
FR-UR1	Post Review	The application shall allow a user to review a product that they have purchased. A review can only be posted fifteen days following the date of purchase.
FR-UR2	Display Reviews	The application shall allow a user to view all reviews made on a seller's profile.
FR-UR3	Reply to Review	The application shall allow a seller to reply to a review on their profile. (One per review)

#### 2.4.9. Search, Sort and Trending Features

The search-and-sort function allows the users to browse the marketplace by limiting their options to a set of inputted keywords, which is an essential feature for platforms that are expected to host several thousands of users. The omission of this feature will make navigating through the market a lot harder for those who are looking for a particular product. However, for simplicity, the search keywords will be limited to the title and category of the listings and will not include searching the description of a listing for matching keywords.

Figure 2.7.: Search Use Case Diagram

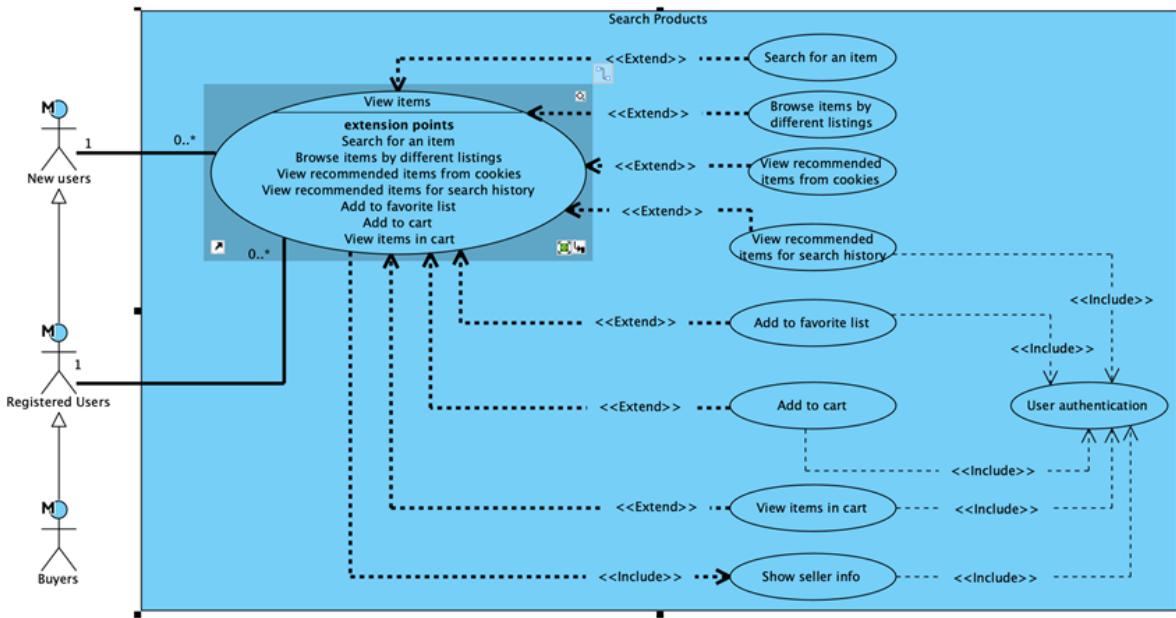


Table 2.12.: Search, Sort and Trending Functional Requirements (FR-SST)[11].

Feature ID	Feature Name	Description
FR-SST1	Search Store	The application shall allow a user to input keywords into a search bar and initiate a search across the entire marketplace.
FR-SST2	Sort Store by price	The application shall allow a user to sort the store page by ascending and descending price.
FR-SST3	Sort Store by Release Date	The application shall allow a user to sort the store page by the newest/oldest release.
FR-SST4	Sort Store by Alphabetical Order	The application shall allow a user to sort the store page by alphabetical or reverse alphabetical order.
FR-SST5	Display Trending Listings	The application shall display the trending listings in a banner on the storefront.
FR-SST6	Update Trending List	The system shall periodically perform an update on the list of trending products and sellers.
FR-SST7	Filter	The system shall allow users to filter search results or the store to easily find postings of interest.

#### 2.4.10. Administrator Profile

An administrative profile is a user feature that is necessary for system maintenance and also grants access to the “Admin” privileged tools such as sales reports, and revenue generated, list of user profiles, etc.

Figure 2.8.: Administrative Use Case Diagram

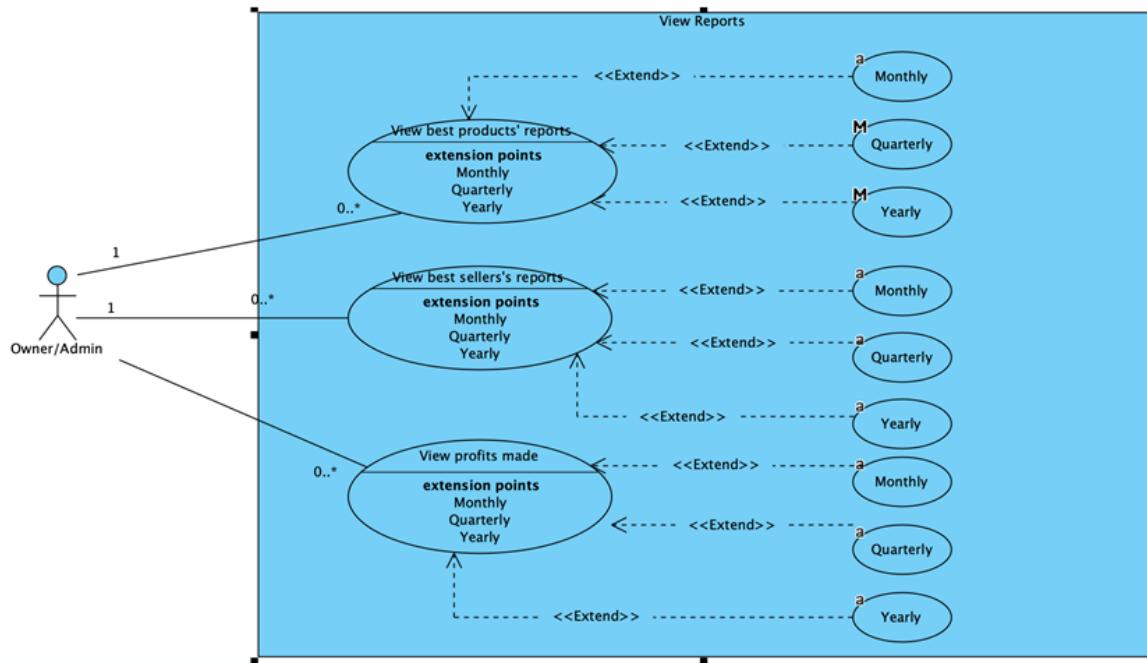


Table 2.13.: Administrative Functional Requirements (FR-AP)[11].

Feature ID	Feature Name	Description
FR-AP1	Display Sales Data	The application shall allow an administrator to view all sales data, which includes all transactions made through the website.
FR-AP2	Display Platform Revenue	The application shall allow an administrative user to view data related to the growth and profitability of the platform.
FR-AP4	Delete User	The application shall allow an administrator to remove a user account.
FR-AP5	Edit User	The application shall allow an administrator to edit the user profile of any registered user.
FR-AP8	Newcomer Fee	The application shall charge a 3% transaction fee instead of 8% for the first 10 items sold by a new seller.

## 2.5. Other Non-Functional Requirements

This section discusses the non-functional requirements that outline how the system is designed to behave.

### 2.5.1. Performance Requirements

Non-functional performance requirements are shown in **Table 5.1**.

Table 2.14.: Performance Non-Functional Requirements (NFR-PREQ)[11].

Feature ID	Feature Name	Description
NFR-PREQ1	Multi Browser Support	A type of online platform will not limit the website design.
NFR-PREQ2	Scalability	The design will be scalable to maximize the volume of the transactions (support at least 100 clients and 100 sellers).
NFR-PREQ3	Ease Of User Creation	Account creation and authentication is a minimalist process.
NFR-PREQ4	Timely Transaction Processing	Transactions should be processed quickly, alerts to the users are immediate, to minimize delays.

### 2.5.2. Safety Requirements

Non-functional safety requirements are shown in **Table 5.2.**

Table 2.15.: Safety Non-Functional Requirements (NFR-SFT)[11].

Feature ID	Feature Name	Description
NFR-SFT1	Receipt Generation	The system will provide the customer with a proof of purchase upon payment completion.
NFR-SFT2	Concealed Seller Information	The system hides the contact details of the seller from buyers.
NFR-SFT3	Continuous Support	Customer support contact information will be accessible to all buyers upon purchase.
NFR-SFT4	Inclusive Environment	The platform will not tolerate any illegal or sexual content.

### 2.5.3. Security Requirements

Non-functional security requirements are shown in **Table 5.3.**

Table 2.16.: Security Non-Functional Requirements (NFR-SRT)[11].

Feature ID	Feature Name	Description
NFR-SRT1	User Monitoring	The users have to authenticate themselves.
NFR-SRT2	Payment Security	All payments are handled by a third-party.
NFR-SRT3	Complete Account Management	The users' passwords are re-settable.

### 2.5.4. Software Quality Attributes

Non-functional software quality attributes requirements are shown in **Table 5.4.**

Table 2.17.: Software Quality Attributes Non-Functional Requirements (NFR-SQA)[11].

Feature ID	Feature Name	Description
NFR-SQA1	Back-ended Site Data	Payment processing and data management are separate and not handled by the client.
NFR-SQA2	Mobile Support	The design is mobile friendly.
NFR-SQA3	Quality of UI Experience	The user interface does not contain illegible fonts, and the selected colours complement each other.
NFR-SQA4	Content Simplicity	The web pages will contain a fair balance of text and visual material.
NFR-SQA5	Payment Reliability and Consistency	The system should not lose payments that pass-through PayPal.

### 2.5.5. Business Rules

Non-functional business requirements are shown in **Table 5.5.**

Table 2.18.: Business Rules Non-Functional Requirements (NFR-BR)[11].

Feature ID	Feature Name	Description
NFR-BR1	Real-Time Accounting	The website posts all transactions to the ledger, and a report can be viewed by management in real-time.
NFR-BR2	Omnipresent User Support	The website users can reach out to customer support for any help with our site.
NFR-BR3	Shipping Time Objectives	The seller has a time limit to notify the shipment of the product.
NFR-BR4	Buyer Account Flexibility	We will not limit buyers to one address, but they will be limited to a maximum of three different addresses.
NFR-BR5	Include an 'About Us' page	The website should have a description of the company, its history and future goals.
NFR-BR6	Include a 'Privacy Policy' page.	The website should have a description of the privacy policy outlining the extent to which data is collected and used by our services.

## 2.6. Unit Testing

Unit testing is an integral part of the development process and ensures that every section of the code works as appropriately. The unit testing for all features has been completed, and this section outlines those tests in **Table 2.19.**

Table 2.19.: Unit Tests

Test Case ID	Requirement ID	Test Case Name	Test Steps	Expected Result
T-0001	FR-ACS1	Valid email address	<ol style="list-style-type: none"> <li>Proceed to the Registration Page.</li> <li>Enter an email of the format [WORDS]@[WORDS].[WORDS].</li> <li>Fill in the rest of the Registration form.</li> <li>Send the information.</li> </ol>	The user is able to use the email address.
T-0002	FR-ACS1	Invalid email address	<ol style="list-style-type: none"> <li>Proceed to the Registration page.</li> <li>Enter an email that does not follow the format [WORDS]@[WORDS].[WORDS].</li> <li>Fill in the rest of the Registration form.</li> <li>Send the information.</li> </ol>	The user is unable to use the email address.
T-0003	FR-ACS2	Valid pass-word format	<ol style="list-style-type: none"> <li>Proceed to the Registration page.</li> <li>Enter a password that has at least one upper case, one special character, and eight or more characters.</li> <li>Fill in the rest of the Registration form.</li> <li>Send the information.</li> </ol>	The password can be used.
T-004	FR-ACS2	Invalid pass-word format	<ol style="list-style-type: none"> <li>Proceed to the registration page.</li> <li>Enter a password that has at least one upper case, one special, and eight or more characters.</li> <li>Fill in the rest of the Registration form.</li> <li>Send the information.</li> </ol>	The password cannot be used.
T-0005	FR-ACS3	Receive email confirmation	<ol style="list-style-type: none"> <li>Proceed to the Registration page.</li> <li>Fill in the Registration form with valid information.</li> <li>Send the information.</li> <li>Open the email box of the written email address.</li> <li>Find and open the confirmation email for 354TheStars.</li> <li>Follow the instruction in the confirmation email to complete the account registration.</li> </ol>	A confirmation email is received in the email box and the user can login after completing the registration.
T-0006	FR-ACS3	Attempt to log-in on unconfirmed account	<ol style="list-style-type: none"> <li>Proceed to the Registration page.</li> <li>Fill in the Registration form with valid information</li> <li>Send the information.</li> <li>Proceed to the Login page.</li> <li>Login with the previously registered account.</li> </ol>	The user is unable to login before confirming his account.
T-0007	FR-ACS4	Register an account	<ol style="list-style-type: none"> <li>Proceed to the Registration page.</li> <li>Fill in the Registration form with valid information.</li> <li>Send the information.</li> </ol>	An account is created.
T-0008	FR-PM1	Change email address	<ol style="list-style-type: none"> <li>Proceed to the Login page.</li> <li>Sign in with an existing account.</li> <li>Proceed to the Account Settings page.</li> <li>Change the email address to a new valid address.</li> </ol>	The password is successfully changed.
T-0009	FR-PM2	Change pass-word	<ol style="list-style-type: none"> <li>Proceed to the Login page.</li> <li>Sign in with an existing account.</li> <li>Proceed to the Account Settings page.</li> <li>Change the password to a new valid password.</li> </ol>	The password is successfully changed.

T-0010	FR-PM3	Add shipping address	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to the Account Settings page.</li> <li>4. Add a new shipping address.</li> </ol>	The user is able to add a shipping address.
T-0011	FR-PM3	Shipping address limit	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to the Account Settings page.</li> <li>4. Add as many shipping addresses as possible.</li> </ol>	The user is unable to add more than three shipping addresses.
T-0012	FR-PM4	Remove shipping address	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to the Account Settings page.</li> <li>4. Add a new shipping address</li> <li>5. Delete the created shipping address.</li> </ol>	The user is able to delete the shipping address.
T-0013	FR-PM5	Edit shipping address	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to the Account Settings page.</li> <li>4. Add a new shipping address</li> <li>5. Modify the created shipping address.</li> </ol>	The user is able to edit a previously added shipping address.
T-0017	FR-PM9	View pending transaction history	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Purchase the article and complete the payment.</li> <li>5. Proceed to the Transaction History page.</li> </ol>	The user is able to see the article he has purchased while it is pending.
T-0018	FR-PM9	View completed transaction history	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Purchase the article and complete the payment.</li> <li>5. Wait for the seller to set the order status to completed.</li> <li>6. Proceed to the Transaction History page.</li> </ol>	The user is able to see the article he has purchased after the order has been completed.
T-0019	FR-PM10	View receipt of pending transaction	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Purchase the article and complete the payment.</li> <li>5. Proceed to the Transaction History page.</li> <li>6. View the receipt of the article's transaction.</li> </ol>	The user is able to see the receipt of a pending transaction.
T-0020	FR-PM10	View receipt of completed transaction	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Purchase the article and complete the payment.</li> <li>5. Wait for the seller to set the order status to completed.</li> <li>6. Proceed to the Transaction History page.</li> <li>7. View the receipt of the article's transaction.</li> </ol>	The user is able to see the receipt of the completed transaction.
T-0021	FR-PM11	View active listing	<ol style="list-style-type: none"> <li>1. Proceed to the Main page.</li> <li>2. Search for new articles.</li> <li>3. View any article that is still active.</li> </ol>	The user is able to see active listings.
T-0022	FR-PM11	View completed listing	<ol style="list-style-type: none"> <li>1. Proceed to the Main page.</li> <li>2. Search for older articles.</li> <li>3. View any article that is no longer active.</li> </ol>	The user is able to see completed listings.
T-0023	FR-PM12	View ratings	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to the user profile.</li> </ol>	The user is able to see his seller rating.

T-0024	FR-PM13	View reviews	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Purchase the article and complete the payment.</li> <li>5. Wait for the seller to set the order status to completed.</li> <li>6. Write a review for the purchased article</li> <li>7. Proceed to the User Reviews page.</li> </ol>	The user is able to see a list of his reviews, including the review that has been written.
T-0025	FR-PM14	View order status	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Purchase the article and complete the payment.</li> <li>5. Proceed to the Orders page.</li> </ol>	The user is able to see the status of his current order.
T-0026	FR-PM15	Change order status	<ol style="list-style-type: none"> <li>1. Users A and B log in with two different accounts.</li> <li>2. User A proceeds to the Create Listing page.</li> <li>3. User A completes the creation of the article.</li> <li>4. User B proceeds to User A's article page.</li> <li>5. User B purchases the article and completes the payment.</li> <li>6. User A proceeds to the Orders page.</li> <li>7. User A changes the status of the pending order.</li> </ol>	User A is able to change the status of the order. User B is able to see the changes done to the order.
T-0027	FR-AR1 FR-AR2 NFR-SRT3	Recover password	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Recover the password of an existing account.</li> <li>3. Open the email box of the account's email account.</li> <li>4. Find and open the account recovery message from 354TheStars.</li> <li>5. Follow the instructions to complete the account recovery.</li> </ol>	The user receives a mail about recovering his account's password and is able to change it through a temporary password.
T-0028	FR-LOG1	Regular login	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> </ol>	The user is able to log in.
T-0029	FR-LOG1	Browsing login	<ol style="list-style-type: none"> <li>1. Proceed to any article's page.</li> <li>2. Open the Login interface.</li> <li>3. Sign in with an existing account.</li> </ol>	The user logs in and returns to the page he was at prior.
T-0030	FR-LOG2	Admin login	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing administrator account.</li> </ol>	The user is able to log in using admin credentials.
T-0031	FR-SC1	Add product listing to cart	<ol style="list-style-type: none"> <li>1. Proceed to any article's page.</li> <li>2. Add the article to the shopping cart.</li> </ol>	The user is able to add an article to the shopping cart.
T-0032	FR-SC2	Remove product listing from cart	<ol style="list-style-type: none"> <li>1. Proceed to any article's page.</li> <li>2. Add the article to the shopping cart.</li> <li>3. Proceed to the Shopping Cart page.</li> <li>4. Remove the article from the shopping cart.</li> </ol>	The user is able to remove an article from the shopping cart.
T-0033	FR-SC3	update quantity of product listing in cart	<ol style="list-style-type: none"> <li>1. Proceed to any article's page.</li> <li>2. Add the article to the shopping cart.</li> <li>3. Proceed to the Shopping Cart page.</li> <li>4. Change the quantity purchased for the article.</li> </ol>	The user is able to modify the number of items purchased from the shopping cart.

T-0034	FR-SC4	Save cart	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Add the article to the shopping cart.</li> <li>5. Close and reopen the browser.</li> <li>6. Proceed to the Shopping Cart page.</li> </ol>	The shopping cart is saved throughout browsing sessions.
T-0035	FR-PS1	Select available shipping address	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to the Account Settings page.</li> <li>4. Add a shipping address to the profile.</li> <li>5. Proceed to any article's page.</li> <li>6. Add the article to the shopping cart.</li> <li>7. Proceed to the Shopping Cart page.</li> <li>8. Start the payment procedure.</li> <li>9. Select the previously created shipping address.</li> </ol>	The user is able to select an existing shipping address.
T-0036	FR-PS1	Select new shipping address	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Add the article to the shopping cart.</li> <li>5. Proceed to the Shopping Cart page.</li> <li>6. Start the payment procedure.</li> <li>7. Select the option to create a new shipping address.</li> </ol>	The user is able to create a new shipping address without having to return to the Account Settings page.
T-0037	FR-PS2	Select shipping method	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Add the article to the shopping cart.</li> <li>5. Proceed to the Shopping Cart page.</li> <li>6. Start the payment procedure.</li> <li>7. Select a shipping method.</li> </ol>	The user is able to select a shipping method.
T-0038	FR-PS3	Payment checkout	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Add the article to the shopping cart.</li> <li>5. Proceed to the Shopping Cart page.</li> <li>6. Start the payment procedure.</li> <li>7. Fill in the required information and proceed to the Checkout.</li> </ol> <p>The user is able to pay for any number of articles in the shopping cart.</p>	
T-0039	FR-PS4	Payment processing	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Add the article to the shopping cart.</li> <li>5. Proceed to the Shopping Cart page.</li> <li>6. Start the payment procedure.</li> <li>7. Fill in the required information and proceed to Checkout.</li> </ol>	The user can pay using PayPal, and the payment is handled by PayPal.
T-0040	FR-PS5	Product purchase notification	<ol style="list-style-type: none"> <li>1. Users A and B log in with two different existing accounts.</li> <li>2. User A proceeds to the Create Article page.</li> <li>3. User A completes the creation of the article.</li> <li>4. User B proceeds to User A's article page.</li> <li>5. User B purchases the article and completes the payment.</li> </ol>	User A receives a notification that one of his products have been purchased.

T-0041	FR-PS6	Trans- action confir- mation	1. Users A and B log in with two different existing accounts. 2. User A proceeds to the Create Article page. 3. User A completes the creation of the article. 4. User B proceeds to User A's article page. 5. User B purchases the article and completes the payment.	Both Users A and B re- ceive transaction con- firmations.
T-0042	FR- PLS1	Create listing	1. Proceed to the Login page. 2. Sign in with an existing account. 3. Proceed to the Create Listing page. 4. Complete the creation of the article.	The user is able to cre- ate an article, and the creation is free.
T-0043	FR- PLS2 FR- PLS4	Edit list- ing	1. Proceed to the Login page. 2. Sign in with an existing account. 3. Proceed to the Create Listing page. 4. Complete the creation of the article. 5. Proceed to the article's page. 6. Edit the article's information.	The user is able to chagne the title, de- scription, price, cat- egory, condition and quantity of the article.
T-0045	FR- PLS5	Set Con- dition	1. Proceed to the Login page. 2. Sign in with an existing account. 3. Proceed to the Create Listing page. 4. Set the condition of the article.	The user is able to set the condition of the ar- ticle.
T-0046	FR- PLS6	Set Cat- egory	1. Proceed to the Login page. 2. Sign in with an existing account. 3. Proceed to the Create Listing page. 4. Set the category of the article.	The user is able to set the category of the ar- ticle.
T-0047	FR- PLS7	Set De- scription	1. Proceed to the Login page. 2. Sign in with an existing account. 3. Proceed to the Create Listing page. 4. Set the description of the article.	The user is able to set a description for the arti- cle.
T-0048	FR- PLS7	Description Length	1. Proceed to the Login page. 2. Sign in with an existing account. 3. Proceed to the Create Listing page. 4. Write over 1000 characters for the article's description.	The user is unable to set a description with over 1000 characters for the article.
T-0049	FR- PLS8	Set Title	1. Proceed to the Login page. 2. Sign in with an existing account. 3. Proceed to the Create Listing page. 4. Set the title of the article.	The user is able to set a title for the article.
T-0050	FR- PLS9	Upload Images	1. Proceed to the Login page. 2. Sign in with an existing account. 3. Proceed to the Create Listing page. 4. Upload images for the article.	The user is able to up- load images for the ar- ticle.
T-0051	FR- PLS10	Hide Listing	1. Proceed to the Login page. 2. Sign in with an existing account. 3. Proceed to the Create Listing page. 4. Complete the creation of the article. 5. Proceed to the article's page. 6. Hide the article. 7. Search for the article.	The user is able to hide an article he has created. Hidden arti- cles cannot be found by searching.
T-0052	FR- PLS11	Unhide Listing	1. Proceed to the Login page. 2. Sign in with an existing account that has a hidden article. 3. Proceed to the article's page. 4. Unhide the article. 5. Search for the article.	The user is able to un- hide a hidden article he has created. Unhidden articles can be found by searching.

T-0053	FR-PLS12	Delete Listing	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to the Create Listing page.</li> <li>4. Complete the creation of the article.</li> <li>5. Proceed to the article's page.</li> <li>6. Delete the article.</li> </ol>	The user is able to delete an article he has created.
T-0055	FR-RS1	Refunds not allowed	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Purchase the article and complete the payment.</li> <li>5. Proceed to the Transaction History page.</li> </ol>	The user is unable to request a refund on the article.
T-0058	FR-UR1	Post Reviews	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Purchase the article and complete the payment.</li> <li>5. Proceed to the Order List page.</li> <li>6. Post a review for the purchased article.</li> </ol>	The user is able to post a review for the purchased article.
T-0059	FR-UR1	Wait to Review	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Purchase the article and complete the payment.</li> <li>5. Wait fifteen days</li> <li>6. Proceed to the Order List page.</li> <li>7. Post a review for the purchased article.</li> </ol>	The user is able to post a review for an article if fifteen days has elapsed since the purchase.
T-0060	FR-UR1	Non-purchased Review	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Post a review for the article.</li> </ol>	The user is unable to post a review without buying the article first.
T-0061	FR-UR2	View Reviews	<ol style="list-style-type: none"> <li>1. Proceed to the Main page.</li> <li>2. Search for any seller who has received user reviews.</li> <li>3. View the seller's profile page.</li> </ol>	The user is able to see reviews made for the seller.
T-0062	FR-SST1	Search Store	<ol style="list-style-type: none"> <li>1. Proceed to the Main page.</li> <li>2. Search for any item from the search bar.</li> </ol>	The user is able to search for articles by inputting keywords into the search bar.
T-0063	FR-SST2	Sort Store by Price	<ol style="list-style-type: none"> <li>1. Proceed to the Main page.</li> <li>2. Search for any keyword that yields more than one result</li> <li>3. Sort the results by price order.</li> </ol>	The user is able to sort the results by ascending and descending price order.
T-0064	FR-SST3	Sort Store by Release Date	<ol style="list-style-type: none"> <li>1. Proceed to the Main page.</li> <li>2. Search for any keyword that yields more than one result</li> <li>3. Sort the results by release date order.</li> </ol>	The user is able to sort the results by ascending and descending release date order.
T-0065	FR-SST4	Sort Store by Alphabetical Order	<ol style="list-style-type: none"> <li>1. Proceed to the Main page.</li> <li>2. Search for any keyword that yields more than one result</li> <li>3. Sort the results by alphabetical order.</li> </ol>	The user is able to sort the results by ascending and descending alphabetical order.
T-0066	FR-SST5	Display Trending Listings	<ol style="list-style-type: none"> <li>1. Proceed to the Main page.</li> </ol>	The store front displays trending listings in a banner.

T-0067	FR-SST6	Update Trending Listings	1. Proceed to the Main page. 2. Refresh the main page after some time.	The displayed trending listings periodically update.
T-0068	FR-AP1 NFR-BR1	Display Sales Data	1. Proceed to the Login page. 2. Sign in with an existing administrator account. 3. Proceed to the Administration page.	The user is able to see all sales data, including all transaction made through the website.
T-0069	Fr-AP2	Display Platform Revenue	1. Proceed to the Login page. 2. Sign in with an existing administrator account. 3. Proceed to the Administration page.	The user is able to view data related to the growth and profitability of the website.
T-0070	FR-AP3	Edit Transaction Fee	1. Proceed to the Login page. 2. Sign in with an existing administrator account. 3. Proceed to the Administration page. 4. Edit the transaction fee.	The user is able to edit the fee charged to sellers on completed transactions.
T-0071	FR-AP4	Delete User	1. Proceed to the Login page. 2. Sign in with an existing administrator account. 3. Proceed to the Administration page. 4. Find an existing account and delete it.	The user is able to delete user accounts.
T-0072	FR-AP5	Edit User	1. Proceed to the Login page. 2. Sign in with an existing administrator account. 3. Proceed to the Administration page. 4. Find an existing account and edit any of its information.	The user is able to modify the profile information of any account.
T-0073	FR-AP6	Force Maintenance	1. Proceed to the Login page. 2. Sign in with an existing administrator account. 3. Proceed to the Administration page. 4. Force a system maintenance.	The user is able to force a system maintenance.
T-0074	FR-AP6	Access during Maintenance	1. Proceed to the Login page. 2. Sign in with an existing administrator account. 3. Proceed to the Administration page. 4. Force a system maintenance. 5.Sign out of the account.	The user is unable to access the website during maintenance without being logged into an Administrator account.
T-0075	FR-AP6	End Maintenance	1. Proceed to the Login page. 2. Sign in with an existing administrator account. 3. Proceed to the Administration page. 4. Force a system maintenance. 5.Sign out of the account. 6. Repeat steps 1 to 3. 7. End the system maintenance.	The user is able to end the system maintenance.
T-0076	FR-AP7	Deposit Earnings to PayPal	1. Proceed to the Login page. 2. Sign in with an existing administrator account. 3. Proceed to the Administration page. 4. Deposit all earnings to the owner's PayPal.	The user is able to deposit the website's earnings to the owner's PayPal account.
T-0077	NFR-PREQ2	Scalability	1. At least 200 users sign in with different existing accounts. 2. Half of users create articles. 3. The other half of the users purchase the articles.	The website is able to support at least 100 clients and 100 sellers.

T-0078	NFR-PREQ3	Ease of User Account Creation	<ol style="list-style-type: none"> <li>1. Proceed to the Registration page.</li> <li>2. Fill in the Registration form with valid information.</li> <li>3. Send the information.</li> <li>4. Open the email box of the written email address.</li> <li>5. Find and open the confirmation mail for 354TheStars.</li> <li>6. Follow the instructions in the confirmation mail to complete the account registration.</li> <li>7. Proceed to the Login page.</li> <li>8. Sign in with the created account.</li> </ol>	The process of creating the account, confirming it and signing into it should be clear and minimalistic.
T-0079	NFR-PREQ4	Timely Transaction Processing	<ol style="list-style-type: none"> <li>1. Users A and B log in with two different existing accounts.</li> <li>2. User A proceeds to the Create Listing page.</li> <li>3. User A completes the creation of the article.</li> <li>4. User B proceeds to User A's article page.</li> <li>5. User B purchases the article and completes the payment.</li> <li>6. User A proceeds to the Orders page.</li> <li>7. User A changes the status of the pending order to shipped.</li> </ol>	The transaction is quickly processed, and the alerts are received immediately.
T-0080	NFR-SFT1	Proof of Purchase	<ol style="list-style-type: none"> <li>1. Proceed to the Login page</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Purchase the article and complete the payment.</li> </ol>	The user is provided with a proof of purchase upon payment completion.
T-0081	NFR-SFT2	Sales Prohibited outside Website	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article or seller's page.</li> </ol>	The website does not display any contact information of the sellers.
T-0082	NFR-SFT3 NFR-BR2	Continuous Support	<ol style="list-style-type: none"> <li>1. Proceed to the Customer Support page.</li> </ol>	The website displays support contact information.
T-0083	NFR-SRT1	User Monitoring	<ol style="list-style-type: none"> <li>1. Proceed to any article's page.</li> <li>2. Add the article to the shopping cart.</li> <li>3. Proceed to the Shopping Cart page.</li> <li>4. Start the payment procedure.</li> </ol>	The user is unable to proceed with the payment without signing into an account.
T-0084	NFR-SRT2 NFR-SQA5	Payment Security	<ol style="list-style-type: none"> <li>1. Proceed to the Login page.</li> <li>2. Sign in with an existing account.</li> <li>3. Proceed to any article's page.</li> <li>4. Add the article to the shopping cart.</li> <li>5. Proceed to the Shopping Cart page.</li> <li>6. Start the payment procedure.</li> <li>7. Fill in the required information and proceed to Checkout.</li> <li>8. Complete the checkout procedure.</li> </ol>	The payment is only handled by a third-party. The payment should not be lost in the process.
T-0085	NFR-SQA2	Mobile Support	<ol style="list-style-type: none"> <li>1. Visit all the pages of the website using a Mobile phone.</li> </ol>	The website displays correctly.
T-0086	NFR-SQA3	UI Experience	<ol style="list-style-type: none"> <li>1. Visit all the pages of the website.</li> </ol>	The websites does not contain illegible fonts and the colour scheme is pleasant for the eyes.
T-0087	NFR-SQ3	Colour-Blind UI Experience	<ol style="list-style-type: none"> <li>1. Visit all the pages of the website using a colour-blind add-on.</li> </ol>	The website's colour scheme is pleasant for the eyes for a colour-blind user.

T-0088	NFR-SQA4	Simplicity of Content	1. Visit all the pages of the website.	The website does not overwhelm the user with text or visuals.
T-0089	FR-PLS13	Set Price	1. Proceed to the Login page. 2. Sign in with an existing account. 3. Proceed to the Create Listing page. 4. Set the price to \$0.	The price of the product cannot be set to free.
T-0090	FR-UR3	Reply to Review	1. Users A and B log in with two different existing accounts. 2. User A proceeds to the Create Listing page. 3. User A completes the creation of the article. 4. User B proceeds to User A's article page. 5. User B purchases the article and completes the payment. 6. User B proceeds to the Order List page. 7. User B posts a review for the product. 8. User A proceeds to his or her Profile page. 9. User A posts a reply to User B's review.	The seller can reply to a review he or she has received.
T-0091	FR-UR3	One Reply per Review	1. Users A and B log in with two different existing accounts. 2. User A proceeds to the Create Listing page. 3. User A completes the creation of the article. 4. User B proceeds to User A's article page. 5. User B purchases the article and completes the payment. 6. User B proceeds to the Order List page. 7. User B posts a review for the product. 8. User A proceeds to his or her Profile page. 9. User A posts a reply to User B's review. 10. User A posts a second reply to User B's review.	The seller can only post one reply per review he or she has received.
T-0092	FR-SST7	Filter	1. Proceed to the Home page. 2. Search for any keyword with two or more matching listings. 3. Set a filter to modify the search results.	The user is able to use filters to find listings more easily.
T-0093	FR-AP8	Newcomer Fee	1. Proceed to the Register page. 2. Fill in the form with valid information and create the new account. 3. Proceed to the Create Listing page. 4. Create a minimum of 11 listings. 5. Wait for other users to purchase all 11 listings. 6. View the transaction details of the listings.	For every seller, 3% fee is applied for the first 10 listings, and an 8% fee is applied for every listing sold afterwards.

### 2.6.1. Traceability Matrix

The traceability matrix allows us to identify which part of the code or software passed or failed their unit tests or which ones are not tested, because they are not implemented. It is a good tool to help and evaluate progress over the duration of a programs development. The test results for the unit tests are detailed in the following traceability matrix:

Table 2.20.: Traceability Matrix

Feature ID	Feature Name	Description	Test Cases	Status	Defect IDs
FR-ACS1	Validate Email Address	Verify that the email address follow the [WORDS]@[WORDS].[WORDS] sequence of characters.	T-0001	Pass	
			T-0002	Pass	
FR-ACS2	Validate Password	Verify that the entered passwords contain at least one upper case, one special character and a minimum length of eight characters. The password is encrypted and then saved in the database.	T-0003	Pass	
			T-0004	Pass	
FR-ACS3	Edit Confirmation Email	The application will emit a confirmation email upon the creation of the account.	T-0005	Pass	
			T-0006	Fail	BG-169
FR-ACS4	Register Account	The application shall allow a user to create an account from the Login or Register pages on the website.	T-0007	Pass	
FR-PM1	Change Email Address	The application shall allow the user to change the email address of their profile.	T-0008	Pass	
FR-PM2	Change Password	The application shall allow the user to change the password of their account	T-0009	Pass	
FR-PM3	Add Shipping Address(es)	The application shall allow a user to add up to three different shipping addresses.	T-0010	Pass	
			T-0011	Pass	
FR-PM4	Remove Shipping Address(es)	The application shall allow a user to remove a shipping address from their profile.	T-0012	Pass	
FR-PM5	Edit Shipping Address(es)	The application shall allow a user to edit a shipping address in their profile.	T-0013	Pass	
FR-PM9	View Transaction History	The application shall allow a user to see a list of all completed and/or pending transactions.	T-0017	Not Implemented	
			T-0018	Not Implemented	
FR-PM10	View Receipts	The application shall allow a user to access the receipt for any transaction in their transaction history.	T-0019	Not Implemented	
			T-0020	Not Implemented	
FR-PM11	View Product Listings	The application shall allow a user to access a list of all active and completed listings.	T-0021	Pass	
			T-0022	Pass	

FR-PM12	View Ratings	The application shall allow a user to view their current seller ratings.	T-0023	Not Implemented	
FR-PM13	View Reviews	The application shall allow a user to view a list of all the reviews they have registered.	T-0024	Not Implemented	
FR-PM14	View Order Status	The application shall allow a user to display the status of their pending orders.	T-0025	Not Implemented	
FR-PM15	Change Order Status	The application shall allow a seller to change the status of their pending orders. For example, the seller will be able to notify the buyer when the item has shipped.	T-0026	Not Implemented	
FR-AR1	Recover Password	The application shall allow a user to recover their profile password.	T-0027	Pass	
FR-AR2	Emit Temporary Password	The system shall change the user profile password to a temporary password that will be emitted to the user via email.	T-0027	Pass	
FR-LOG1	Login User	The application shall allow a user to log in using their profile credentials either at the Main page or while browsing the shop.	T-0028	Pass	
			T-0029	Pass	
FR-LOG2	Login Administrator	The application shall allow an administrator to log in using their special credentials on the Main page.	T-0030	Pass	
FR-SC1	Add Product Listing(s)	The application shall allow a user to add product listings to their shopping cart.	T-0031	Pass	
FR-SC2	Remove Product Listing(s)	The application shall allow a user to remove a product listing from their shopping cart.	T-0032	Pass	
FR-SC3	Update Quantity	The application shall allow a user to update the number of items to be purchased from product listings in the shopping cart.	T-0033	Pass	
FR-SC4	Save Cart	The application shall allow a user to save their shopping cart to their profile.	T-0034	Pass	
FR-PS1	Select Shipping Address	The application shall allow a user to select a shipping address.	T-0035	Fail	BG-205
			T-0036	Pass	
FR-PS2	Select Shipping Method	The application shall allow a user to select a shipping method.	T-0037	Not Implemented	
FR-PS3	Proceed to Checkout	The application shall allow a user to proceed to pay for one or more items in their shopping cart.	T-0038	Pass	
FR-PS4	Payment Processing	The application shall allow a user to pay online using PayPal. The authorization will also be handled by PayPal.	T-0039	Pass	
FR-PS5	Emit Notification	The system will notify the seller by email when a product has been sold and when a transaction has been completed.	T-0040	Pass	

FR-PS6	Transaction Confirmation	The system shall emit a transaction confirmation to both the seller and the buyer.	T-0041	Pass	
FR-PLS1	Create Listing	The application shall allow users to post new product listings, free of charge.	T-0042	Pass	
FR-PLS2	Edit Listing	The application shall allow users to edit their current post, which includes changing the title, description (maximum 1000 characters), price, category, and condition.	T-0043	Not Implemented	
FR-PLS4	Update Quantity	The application shall allow users to update the available quantity on a listing.	T-0043	Not Implemented	
FR-PLS5	Set Condition	The application shall allow a user to set the condition of their product.	T-0045	Pass	
FR-PLS6	Set Category	The application shall allow a user to set the category of their listing.	T-0046	Pass	
FR-PLS7	Set Description	The application shall allow a user to set a description for their listing, albeit, a maximum of 1000 characters will be allowed.	T-0047	Pass	
			T-0048	Pass	
FR-PLS8	Set Title	The application shall allow a user to set a title of their listing.	T-0049	Pass	
FR-PLS9	Upload Images	The application shall allow a user to upload images for their listing.	T-0050	Not Implemented	
FR-PLS12	Delete Listing	The application shall allow a user to remove a listing.	T-0053	Not Implemented	
FR-PLS13	Set Price	The application shall allow a user to set the price for the listing. Cannot be free.	T-0089	Pass	
FR-RS1	Refund Not Allowed	The application shall not allow a user to demand a refund on any transactions.	T-0055	Pass	
FR-UR1	Post Reviews	The application shall allow a user to review a product that they have purchased. A review can only be posted fifteen days following the date of purchase.	T-0058	Not Implemented	
			T-0059	Not Implemented	
			T-0059	Not Implemented	
FR-UR2	Display Reviews	The application shall allow a user to view all reviews made on a seller's profile.	T-0061	Pass	

FR-UR3	Reply per Review	The application shall allow a seller to reply to a review on their profile. (One reply per review.)	T-0090	Not Implemented	
			T-0091	Not Implemented	
FR-SST1	Search Store	The application shall allow a user to input keywords into a search bar and initiate a search across the entire marketplace.	T-0062	Pass	
FR-SST2	Sort Store by Price	The application shall allow a user to sort the store page by ascending and descending price.	T-0063	Fail	BG-208
FR-SST3	Sort Store by Release Date	The application shall allow a user to sort the store page by the newest/oldest release date.	T-0064	Not Implemented	
FR-SST4	Sort Store by Alphabetical Order	The application shall allow a user to sort the store page by the alphabetical or reverse alphabetical order.	T-0065	Not Implemented	
FR-SST5	Display Trending Listings	The application shall display the trending listings in a banner on the storefront.	T-0066	Not Implemented	
FR-SST6	Update Trending List	The system shall periodically perform an update on the list of trending products and sellers.	T-0067	Not Implemented	
FR-SST7	Filter	The system shall allow users to filter search results of the store to easily find postings of interest.	T-0092	Pass	
FR-AP1	Display Sales Data	The application shall allow an administrator to view all sales data, which includes all transactions made through the website.	T-0068	Not Implemented	
FR-AP2	Display Platform Revenue	The application shall allow an administrative user to view data related to the growth and profitability of the platform.	T-0069	Not Implemented	
FR-AP3	Edit Transactions Fee	The application shall allow an administrative user to change the fee charged to the seller upon completing a transaction.	T-0070	Not Implemented	
FR-AP4	Delete User	The application shall allow an administrator to remove a user account.	T-0071	Not Implemented	
FR-AP5	Edit User	The application shall allow an administrator to edit the user profile of any registered user.	T-0072	Not Implemented	

FR-AP7	Deposit Earnings to PayPal	The application shall allow an administrative user to deposit the site's earnings in the owner's saved PayPal account.	T-0076	Not Implemented	
FR-AP8	Newcomer Fee	The application shall charge a 3% transaction fee instead of 8% for the first 10 items sold by a new seller.	T-0093	Pass	
NFR-PREQ1	Multi-Platform Support	The type of online platform will not limit the website design.	N/A	Pass	
NFR-PREQ2	Scalability	The design will be scalable to maximize the volume of the transactions (including supporting at least 100 clients and 100 sellers).	T-0077	Cannot Test	
NFR-PREQ3	Ease of User Account Creation	Account creation and authentication is a minimalistic process.	T-0078	Pass	
NFR-PREQ4	Timely Transaction Processing	Transactions should be processed quickly, alerts to the users are immediate, to minimize delays.	T-0079	Pass	
NFR-SFT1	Proof of Purchase	The system will provide the customer with a proof of purchase upon payment completion	T-0080	Pass	
NFR-SFT2	Sales Prohibited outside Website	The system hides the contact details of the seller from buyers.	T-0081	Pass	
NFR-SFT3	Continuous Support After Sales	Customer support contact information will be accessible to all users on our website, especially after sales in case of dispute.	T-0082	Not Implemented	
NFR-SFT4	Inclusive Environment	The company will not tolerate any illegal or sexual content.	N/A	N/A	
NFR-SRT1	User Monitoring	Users have to authenticate themselves.	T-0083	Pass	
NFR-SRT2	Payment Security	All payments are handled by a third-party.	T-0084	Pass	
NFR-SRT3	Account Recovery	All accounts are recoverable upon verification.	T-0027	Not Implemented	
NFR-SQA1	Back-end Loaded Site Data	Payment processing and data management are separate and not handled by the client.	N/A	N/A	
NFR-SQA3	Legibility of UI Experience	The user interface does not contain illegal fonts, and the selected colours complement each other.	T-0086	Pass	
NFR-SQA4	Simplicity of Content	The web pages will contain a fair balance of text and visual material.	T-0088	Pass	

NFR-SQA5	Sound Interfacing with E-Platforms	The system should not lose payments that pass through PayPal.	T-0084	Pass	
NFR-BR1	Real-Time Accounting and Business Information	The website posts all transactions to the ledger, and a report can be viewed by management in real-time.	T-0068	Not Implemented	
NFR-BR2	Omnipresent User Support	The website users can reach out to customer support for any help with our site.	T-0082	Not Implemented	
NFR-BR3	Shipping Time Objectives	The buyer will receive the item within fifteen days of purchase.	N/A	N/A	

# 3. Updates to Software Design Document

The objective of this section is to show a high-level overview and decomposition of the system's subsystems.

## 3.1. System Overview

TheStars is an open online marketplace where distributors, both large and small, can sell their merchandise to customers around the world. Our clean and simple design makes our marketplace open and welcoming to users of all experience levels. Account creation is quick and easy, and sellers can begin offering products for sale within minutes. We offer keyword search and various search filters to ensure buyers find the product they want for a price they can afford. Our platform differentiates itself from competitors by offering subsidized shipping, meaning that buyers have access to both standard and express shipping free of charge. Buyers can write reviews of sellers to share their experience with other customers, while sellers have a chance to respond to these reviews.

Our revenue is user-driven, meaning that we only make money when our sellers make money. Each seller will be charged a commission of 3% for the first ten items sold, and 8% for all subsequent items. In order to prevent fraud, sellers are not allowed to list items for free.

Our software also allows administrators to generate site reports to track our earnings. These reports will allow administrators to make informed business decisions and maximize site revenue in the future.

Our platform ensures the security of our users in two ways. First, all user passwords are encrypted using Bcrypt before being transmitted to the server where it is hashed using argon2 and stored into the database. This ensures that user passwords cannot be intercepted by malicious third parties. Second, our platform uses the third-party payment processing software, PayPal. PayPal has a strong reputation for security and is trusted by thousands of users across the world. Our platform has been designed to accept more payment processing options in the future.

The software has the capabilities outlined in the previous report:

- Seller review.
- Unified buyer and seller account.
- Checkout using PayPal.
- Search, Sort and Filter listings on the website.
- Profile Management: this includes name, email, shipping address(es), past transactions, active listings, saved carts, etc.
- Create, edit or delete a product listing.

- Administrators can view monthly and weekly earnings as well as perform administrative tasks such as maintenance or removing inappropriate listings.

In addition, the software now has the following new capabilities:

- Search filters.
- Password encryption.
- Sellers are prohibited from selling items for free.

Finally, though requested by the client, our software lacks the following capability:

- Advertisements display with the help of cookies
- Seller response to reviews.
- Display a list of trending items

## 3.2. System Architecture

The objective of this section is to show a high-level overview and decomposition of the system's subsystems.

### 3.2.1. Decomposition Description

This section will provide an in-depth description of changes made to subsystems outlined in **Figure 3.4 TheStars System Overview** (see old SDD), which were not included in the previous report.

#### Front-End

The front-end of 354TheStars is built using Vuetify which is based upon what is called a “single page presence” in which the entire front-end is a single page and it is dynamically updated to reflect the changes in its state. Furthermore, Vue has something called a `<router-view>` element. This element displays a component depending on the “route” of the web page. This allows us to quickly change what components are displayed on the page by dividing the subsystem’s functionalities into multiple routes. **Figure 3.1** shows a detailed representation of the front-end and its relationship with the back-end.

The front-end uses Bcrypt for password encryption. Passwords are sent to Bcrypt for hashing before they are sent to back-end for validation. See Section **Software Interfaces** for more details.

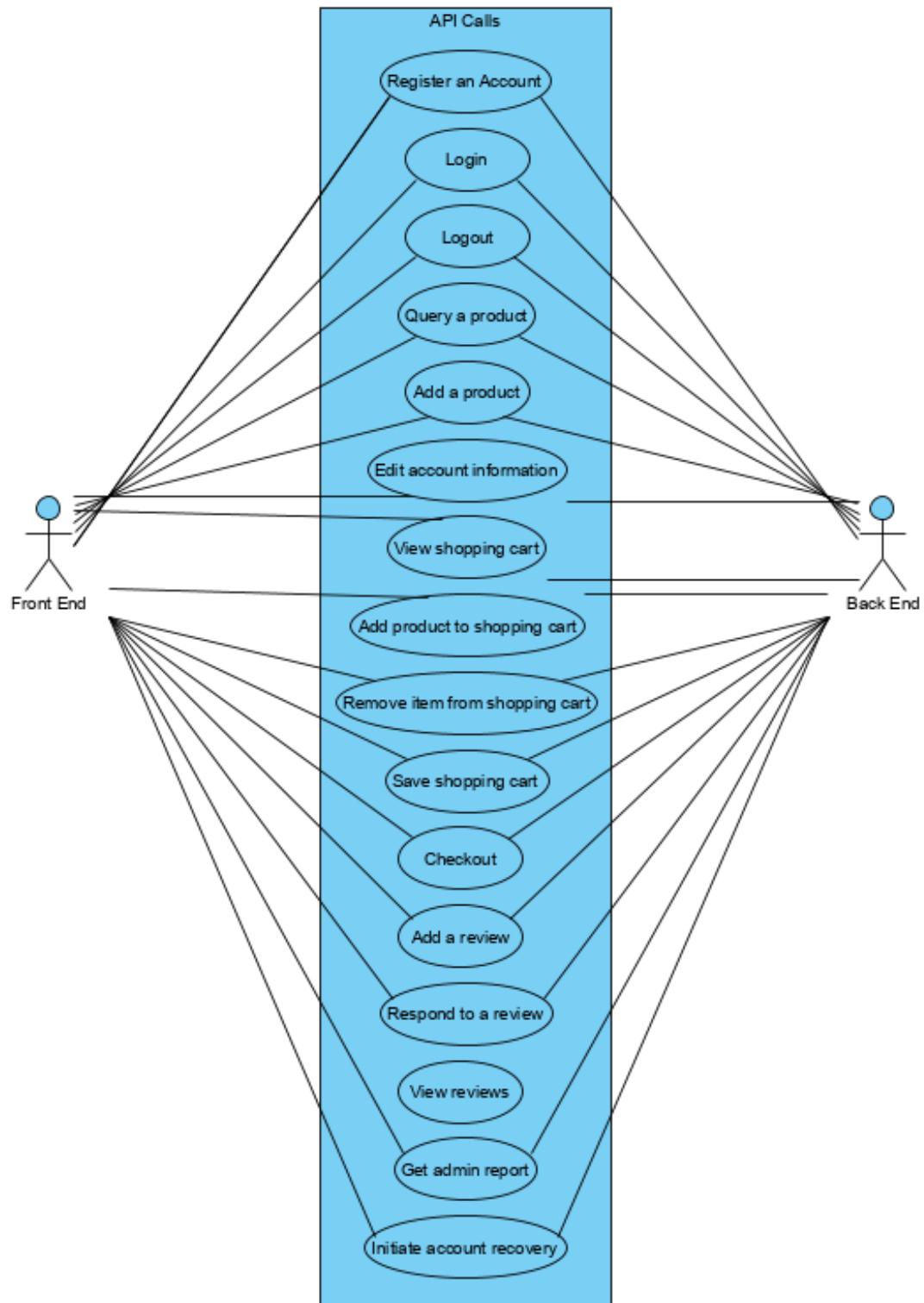
The front-end has sixteen primary component or functions:

- Register an account
- Login
- Logout

- Query a product
- Add a product
- Edit account information
- View shopping cart
- Add product to shopping cart
- Remove item from shopping cart
- Save shopping cart
- Checkout
- Add a review
- Respond to a review
- View reviews
- Get admin report
- Initiate account recovery

The following **Figure 3.1** outlines all the API calls for the previously-mentioned sixteen functions:

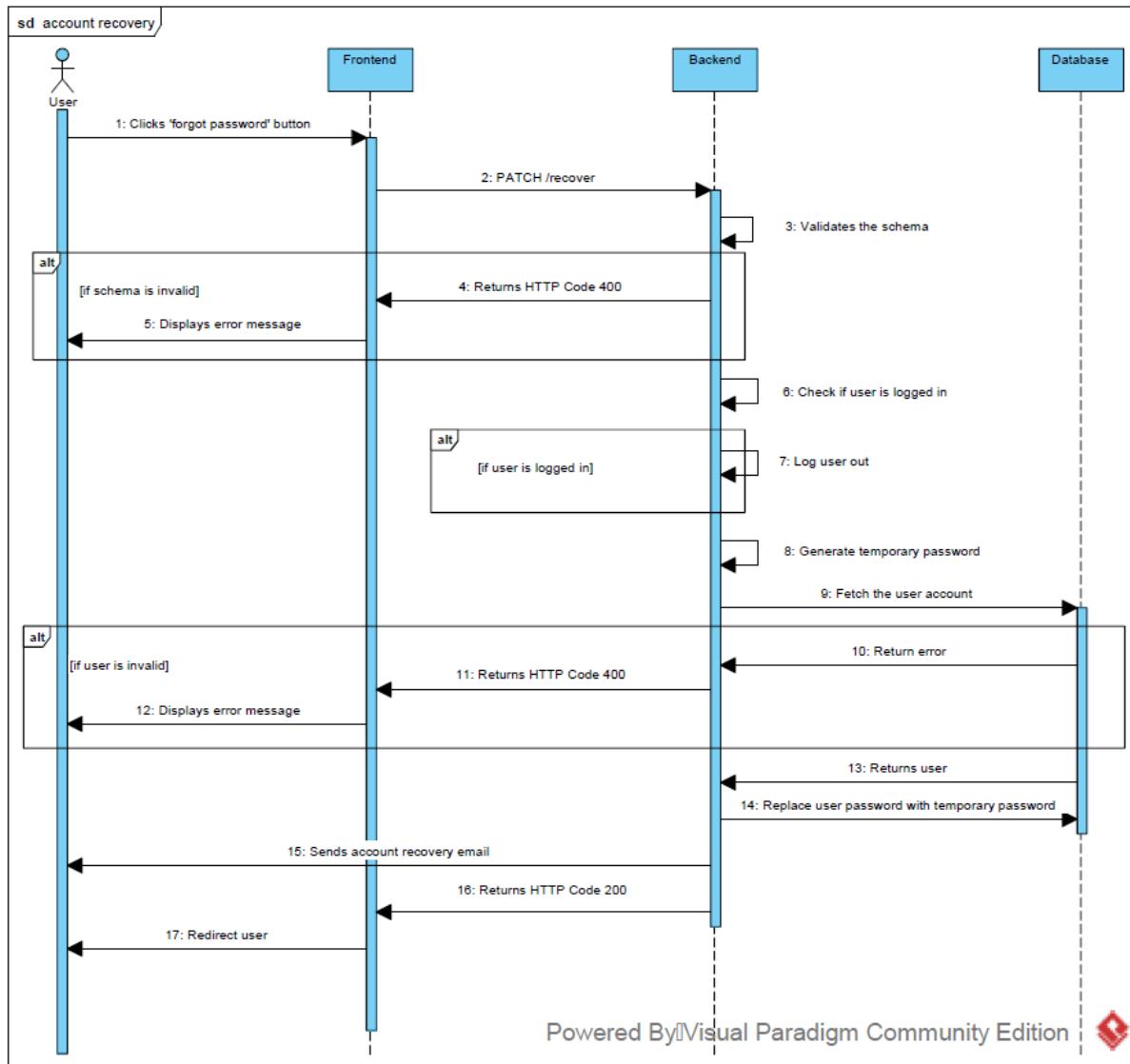
Figure 3.1.: Front-End-Back-End API Use Case



Many of the primary functions of the front-end have been described in the Software Design Document. Below we will highlight new functionalities.

**Figure 3.2** shows the sequence diagram for the account recovery process. When the user requests account recovery, they must enter their email address. The account password is then replaced with a temporary password, which is encrypted before being stored in the database. The temporary password is sent to the email address associated with the user's account. The user can then login to the account using the temporary password. In the email, users are reminded to reset their password after login.

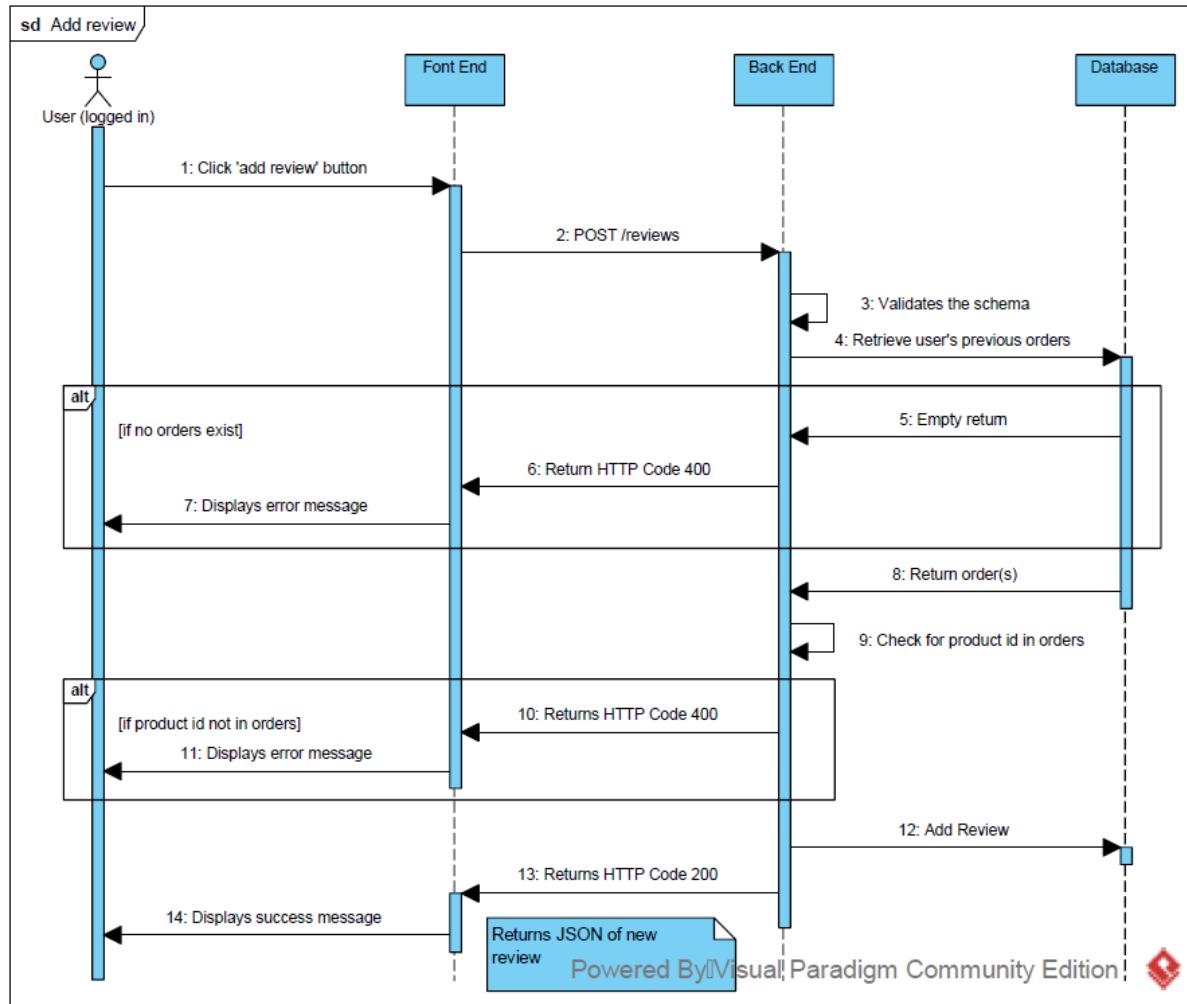
Figure 3.2.: Account Recovery Sequence Diagram



**Figure 3.3** and **Figure 3.4** show the review process. Users who are confirmed to have ordered a product may write a review of the seller. A review consists of a written review and a numeric score out of 5. We clearly see that there are several layers of verification to ensure that only valid customers may write a review. If a seller has not purchased the product, they will not be

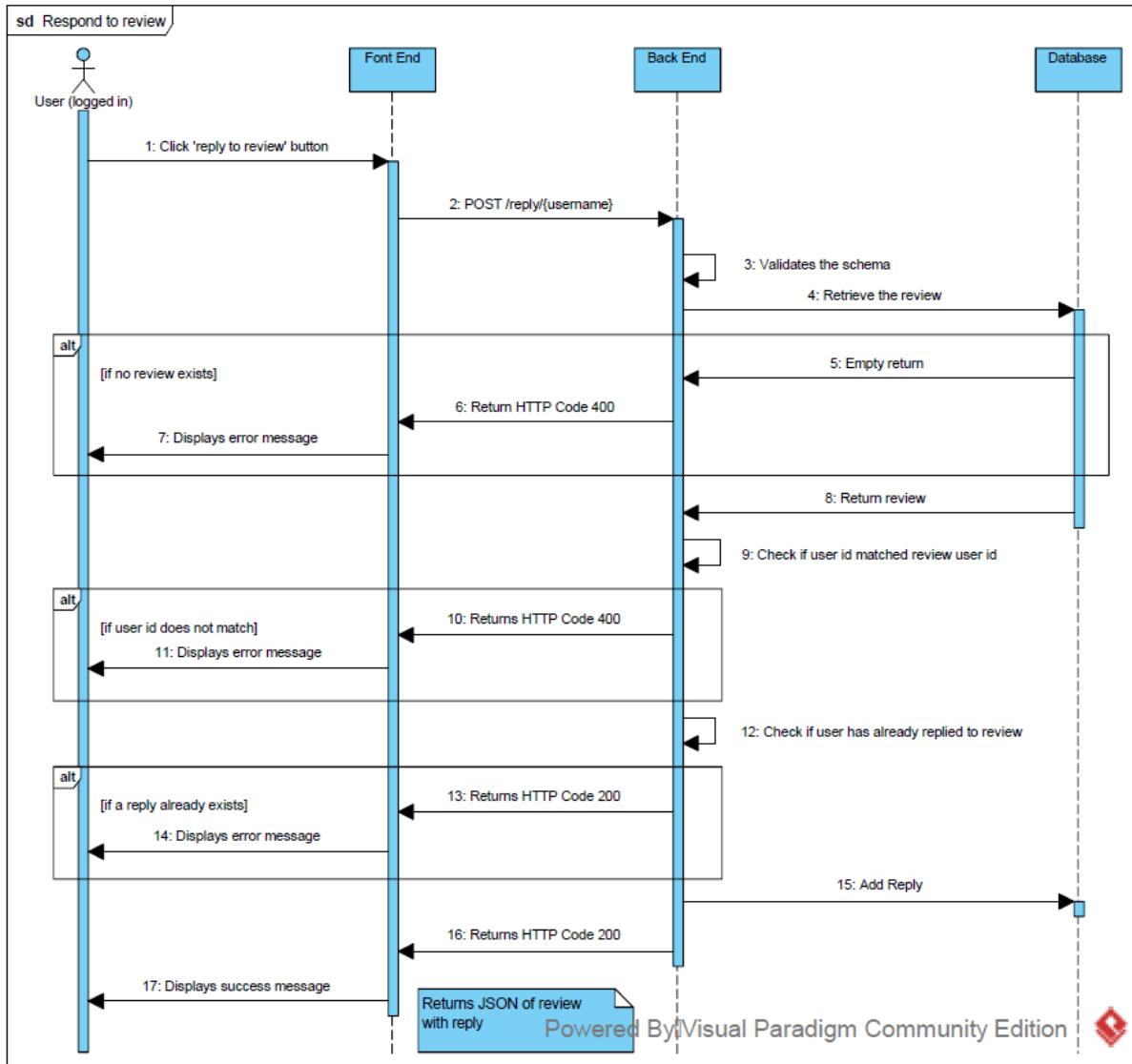
permitted to review the seller. If a review is received successfully, the user will be redirected to the review page. Once a review has been received, sellers may provide a single response to reviews of themselves.

Figure 3.3.: Add Review Sequence Diagram



Below is **Figure 3.4**, the respond to review sequence diagram:

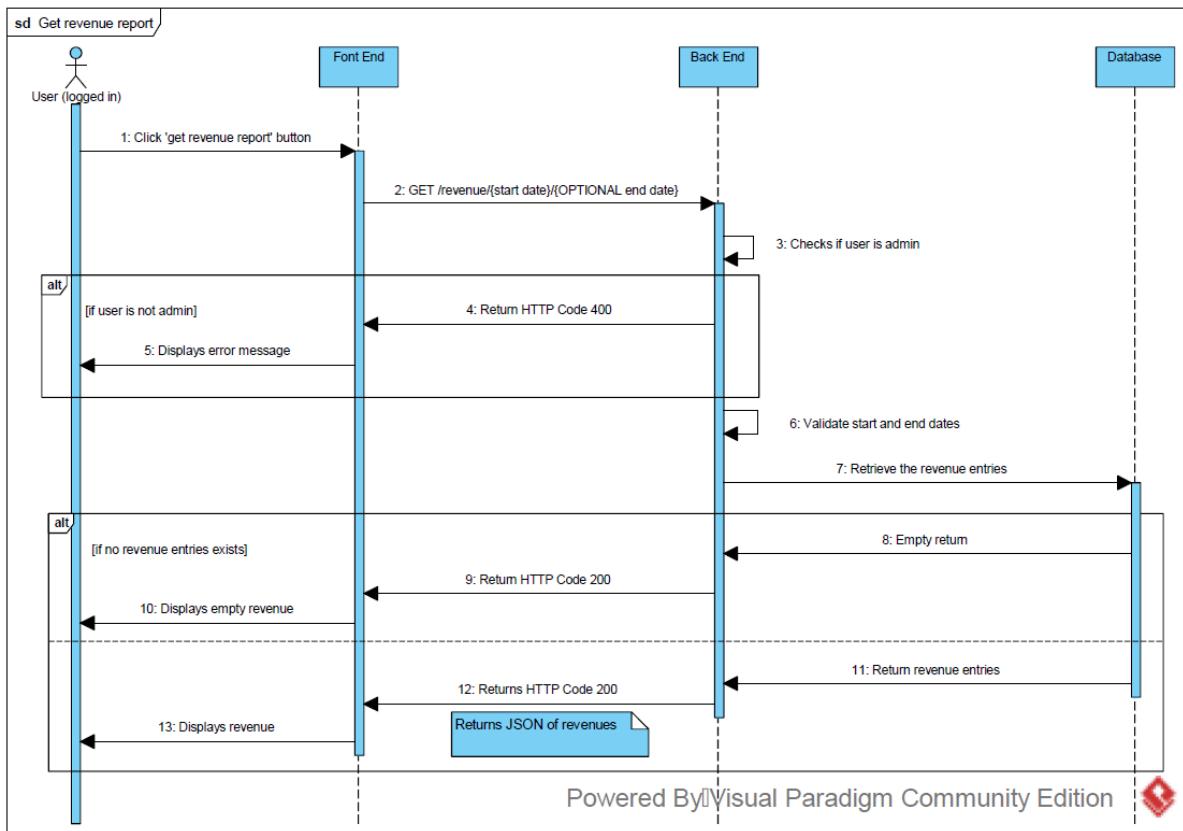
Figure 3.4.: Respond to Review Sequence Diagram



If a user has administrator access, they will have access to platform revenue reports. Administrators may generate reports for different time periods to track revenue over time. If the user requests a report for a time period which has no associated revenue, a blank revenue page will be displayed. If a user who is not an administrator tries to access the reports, an error message will be displayed.

Below is **Figure 3.5**, which documents the revenue report sequence diagram:

Figure 3.5.: Get Revenue Report Sequence Diagram



## Back-End

The following section details the updates to routing, APIs, and the Models' package for the back-end.

**Figure 3.6** shows an updated routing list, which was discussed in the SDD. **Figure 3.5** already portrays a generalization of the use case between the back-end and the database, **Figure 3.7** shows the updated version of a more in-depth use case between the back-end and the database:

Figure 3.6.: High Level Architecture Overview (Updated)

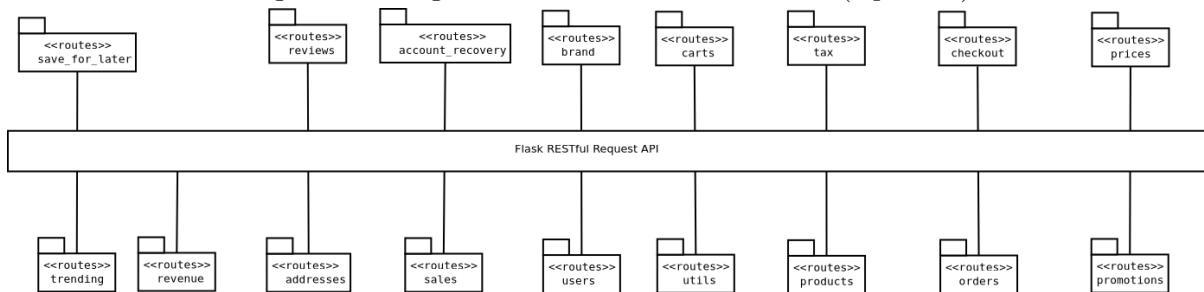
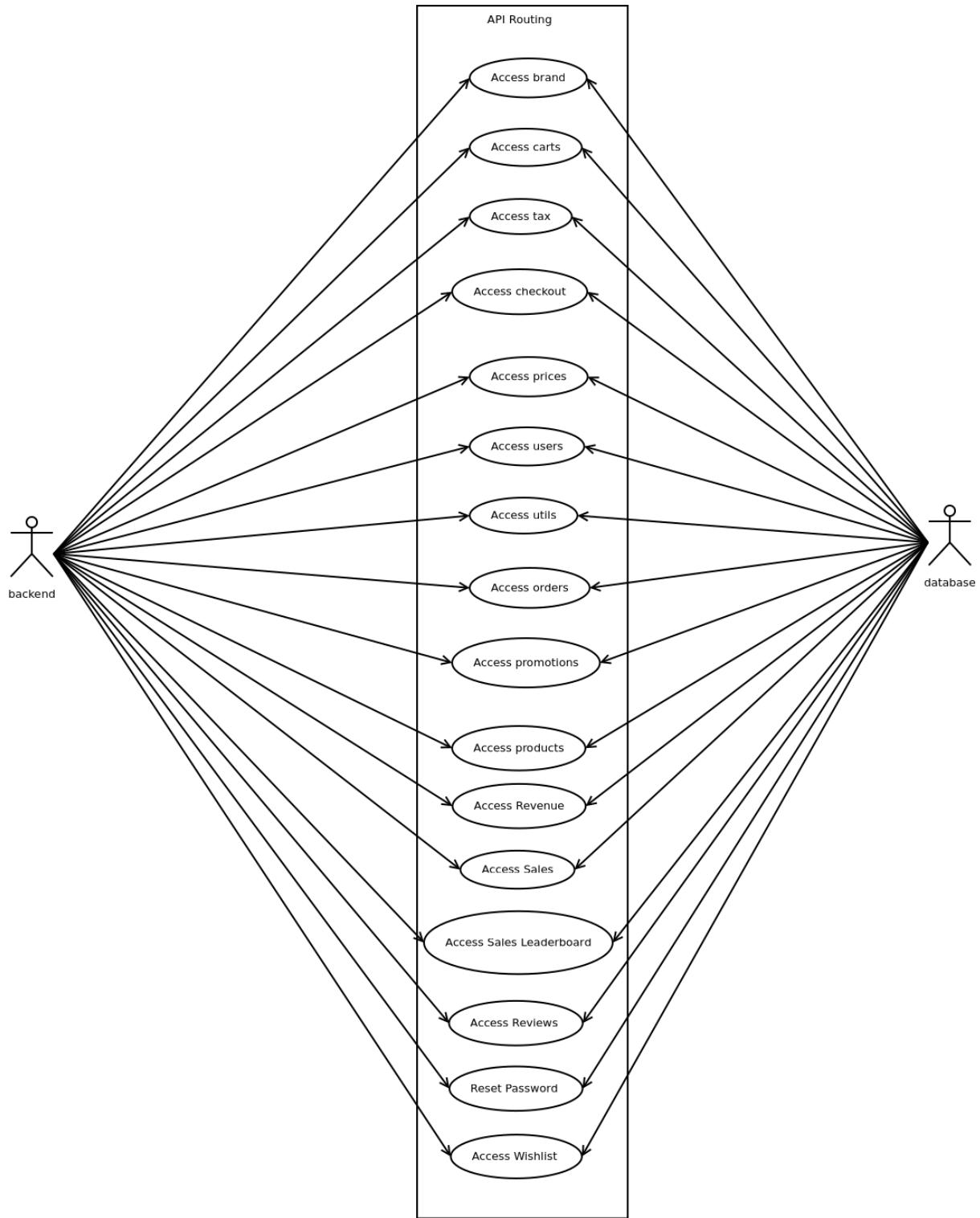


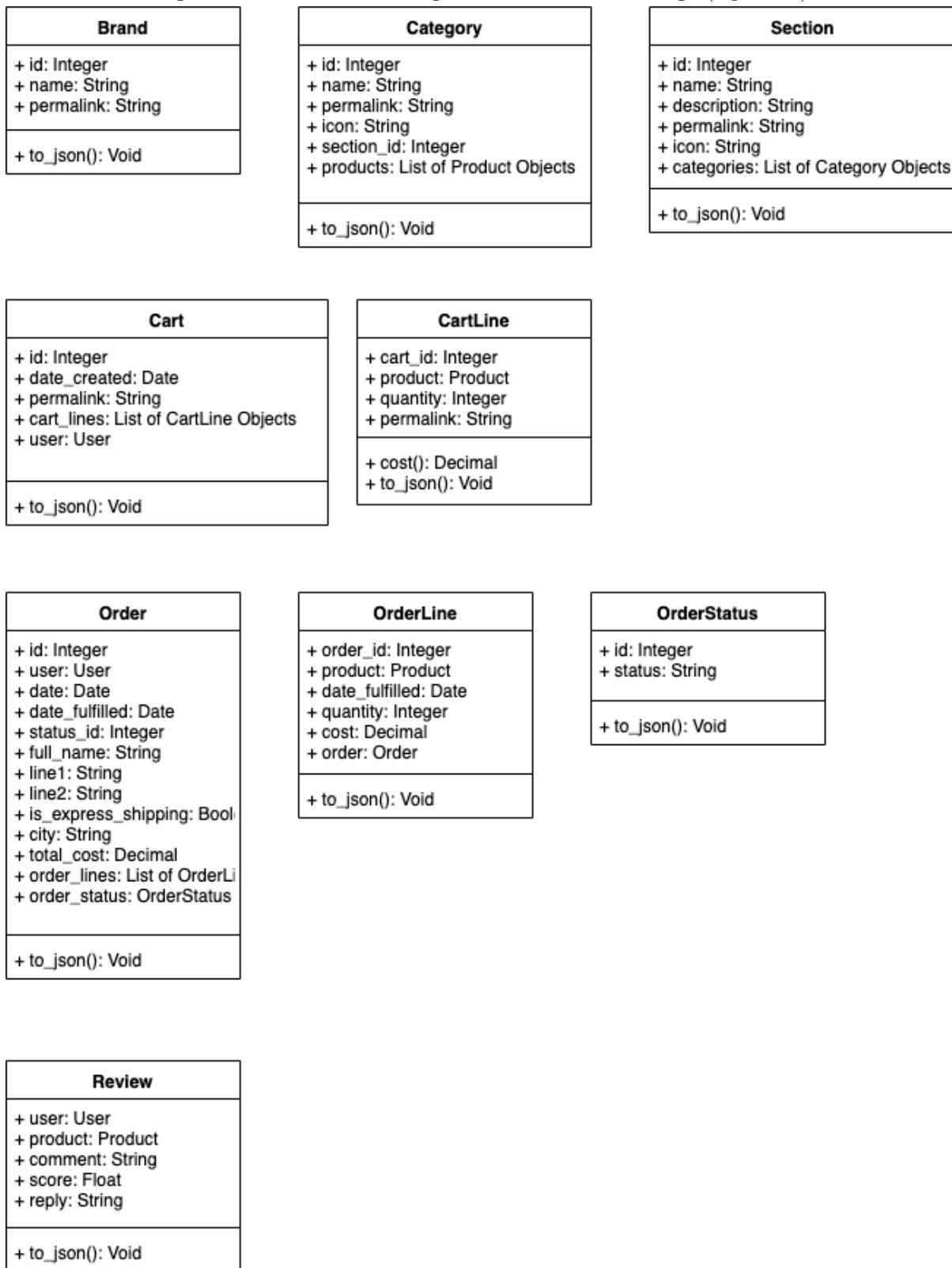
Figure 3.7.: Back-End Routing Use Case



The back-end is built on several key classes described in **Figure 3.8** below, which has been updated from the SDD. Each class represents a table in the database which allows the back-end to manipulate these objects using the SQLAlchemy Python library. Each class has a method that converts the object to JSON[9] for communication with the front-end. Please refer to the

SRS and SDD for more information on tools used to develop the back-end. Class relationships are show in the ER diagram in the section below.

Figure 3.8.: UML Class Diagrams for Models' Package (Updated)



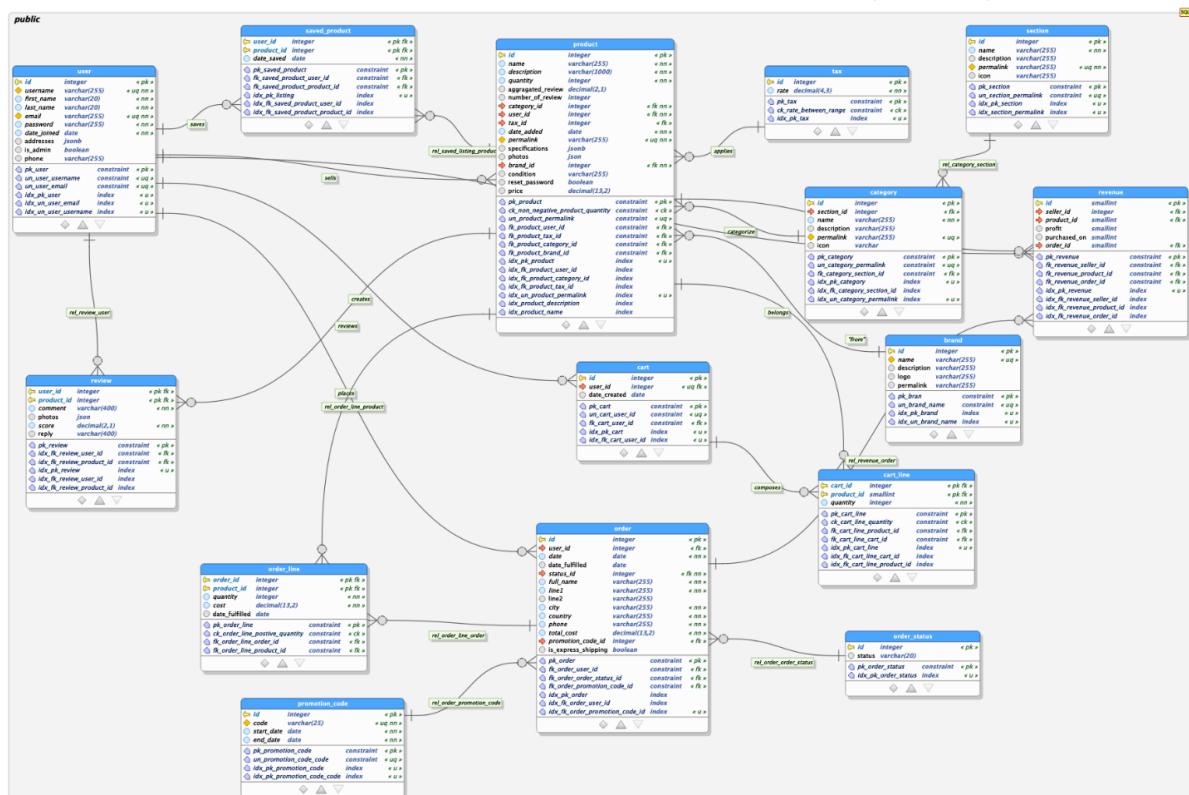
The following are the classes which have been implemented since completing the SDD:

- CartLine: Each CartLine is associated with a Cart and a Product. This means that each item stored in the shopping cart is stored as a CartLine. This implementation allows us to have multiple different types of products per cart.
- Review: Users can write reviews of sellers from whom they have purchased a product. A review contains both a numeric score, and a comment. Sellers can then reply to reviews of themselves.

## Database

As an e-commerce website, 345TheStars must store a large amount of information, and distribute that information as appropriate to multiple users simultaneously. A database is the logical solution to this problem. As mentioned in the SDD, 354TheStars uses a PostgreSQL database, while the Python library SQLAlchemy is used to handle communications between the back-end and database systems. Minor changes have been made to certain fields, but the structure of the database remains the same. **Figure 3.9** shows the final structure of the database.

Figure 3.9.: Database Entity-Relationship Diagram (Updated)



Key tables such as Product and User have been described in detail in the SDD, so we will only discuss important changes here. A Revenue table has been added to the database, which shares a many-to-one relationship with the Category, Product, and Order tables. The purpose of this table is to allow administrators to quickly generate sales reports, as well as calculate platform revenue. Sales reports are generated by date range, so each entry in the Revenue table includes

a ‘purchased\_on’ field to track the date on which the item that generated that revenue was purchased.

### **3.3. Human Interface Design**

This section outlines all the external requirements of the interfaces needed for the software to execute properly.

#### **3.3.1. Overview of User Interface**

As described in both the SRS and the SDD, we have employed "Material Design"[2], to allow for dynamic interaction and superior user experience. The following section describes the functionality of the final product.

The first page a user will access is the Login page, where they can proceed to enter their email and password to continue as a registered user, or they can browse anonymously as a guest. They can also access the account Registration page to create a new account, or the Account Recovery page to reset their password if they no longer have access to it.

The Registration page allows the user the option to enter their first and last names, username, email, password, and confirm the password. Then clicking ‘create’ grants the user an account, assuming they entered the information in the proper formats. They can also cancel registration and return to the Login page.

Upon creating an account and logging in, the user is automatically redirected to the Home page, which offers the vast majority of the site’s functionality. The page’s main purpose is to display current popular item categories to entice users. This page allows the user access to the Shopping Cart page containing their items, to categories to view listings of items, to the Manage Account page, the Create Listing page, the item Search bar, the popular button to view the homepage displaying trending items, logout, or shop now (to do general shopping).

Clicking on shop now, search, or a category brings the user to the Search page, which offers the user the ability to filter items from high to low price or vice versa, filter by price range, or add an item to the shopping cart.

Clicking on the ‘details’ button next to a product will bring the user to the full Product page. Here users can view the full description of the product, as well as other user reviews of that product. Users can also enter a quantity and add the item to their shopping cart.

The Shopping Cart page allows the user to view the total cost of the items, as well as delete any items they do not want. The Shopping Cart has a checkout button, which redirects users to the Checkout page to complete their purchase.

The Checkout page displays the total cost of items including taxes and shipping costs. The user is prompted to input the address where they wish to have their items shipped. The Checkout page features a ‘Proceed to PayPal’ button, which redirects users to PayPal’s payment page (not functional).

The Reviews page allows the user to write a review of the seller, as well as select a score

out of 5. The user can then click the ‘submit’ button to submit the review.

The Manage Account page has four options, which are edit profile, manage password, security, and about. The first option, ‘edit profile’, allows the user to modify their account information include first and last name, email address, and saved shipping address. In order to save the changes, the user must enter their current password. The second option allows users to enter a new password for their account, and they must confirm the changes by entering their current password. The ‘Security’ option which describes the security features of the site. Finally, the ‘About’ option displays the ‘about us’ info text.

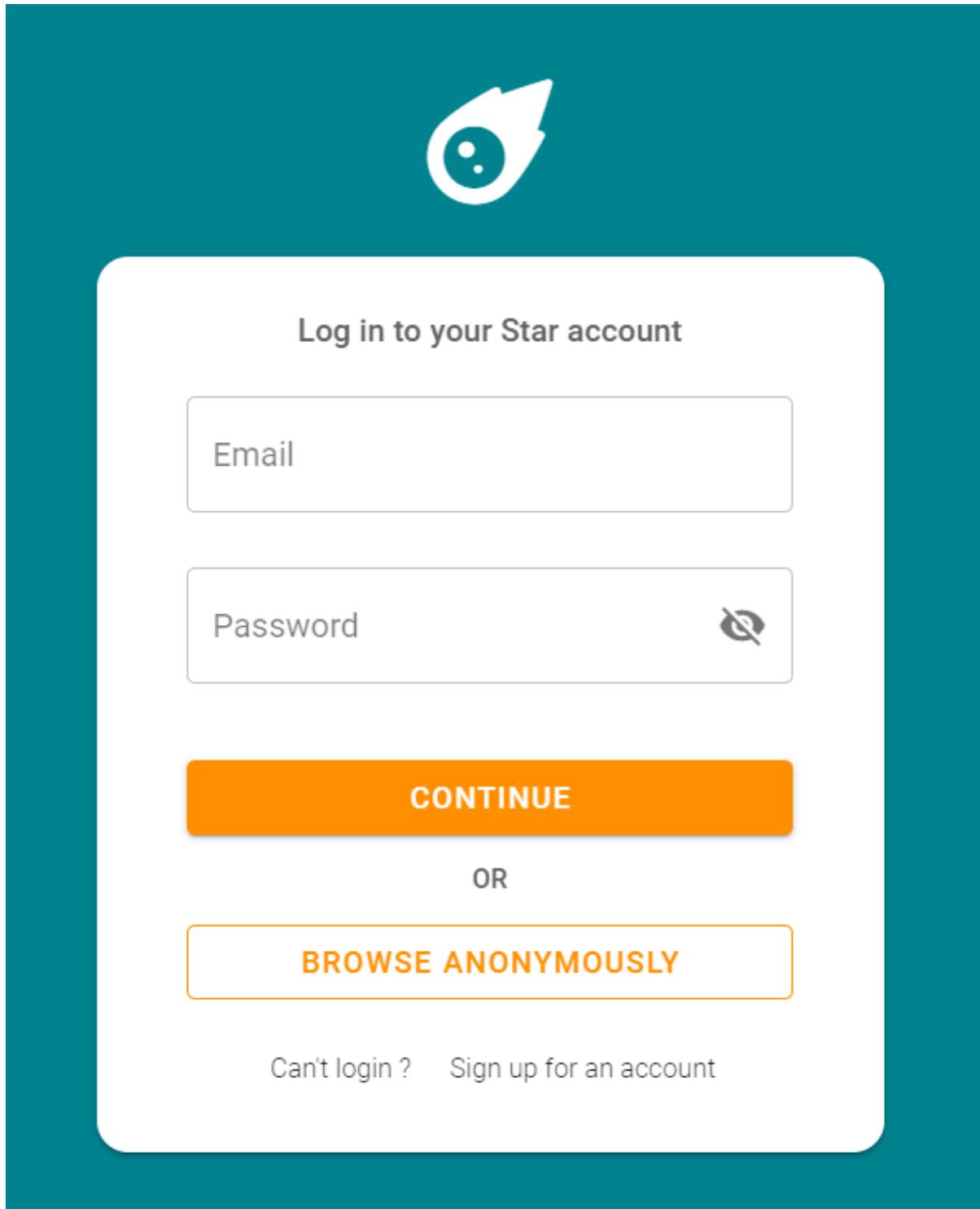
The Create Listing page allows users to list items to be sold on 354TheStars. The user must enter the product name, price, description, category, brand, condition, and quantity. The user can then click the ‘create’ button to list the product for sale.

If the user is an administrator, they will have access to the Admin Analytics page in the main menu. This page has three main functions, ‘Management’, ‘Sales’, and ‘Profit’. The ‘Management’ option allows admins to grant admin privileges to other users. It also allows administrators to perform email and password changes in the event that someone’s account got compromised and the traditional recovery options are not possible. The ‘Sales’ option allows the user to specify a start date, and an optional end date. Once the user clicks the ‘Generate report’ button, the top 10 sellers for that time period will be displayed. The ‘Profit’ optional also allows the user to select a time period. Once the ‘Generate report’ button has been pressed, all revenue sources from that time period will be displayed, along with the date of transaction. This report also shows the total revenue for this time period.

### 3.3.2. Screen Images

Below is an external interface screenshot of the Login page:

Figure 3.10.: Login website page



Below is an external interface screenshot of the Registration page:

Figure 3.11.: Registration website page

# The Stars

Create your Star account

First name

Last name

Username

Email

Password  ?

Password Confirmation

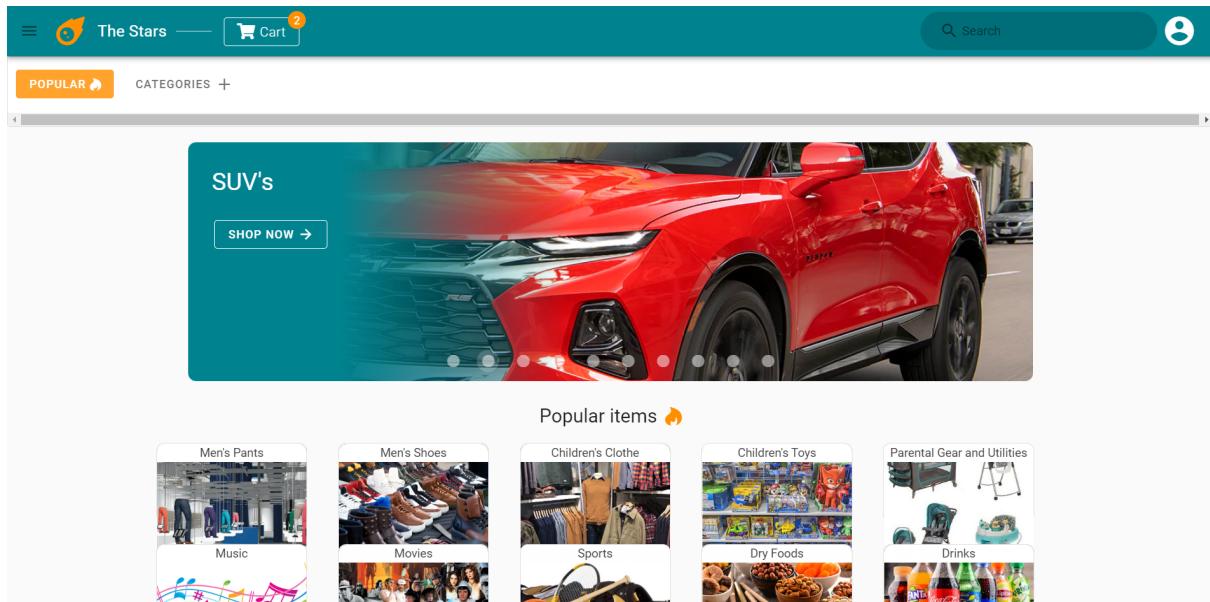
Wonders from the stars.

Logo: An orange graphic resembling a stylized eye or planet with a trail.

**CANCEL** **CREATE**

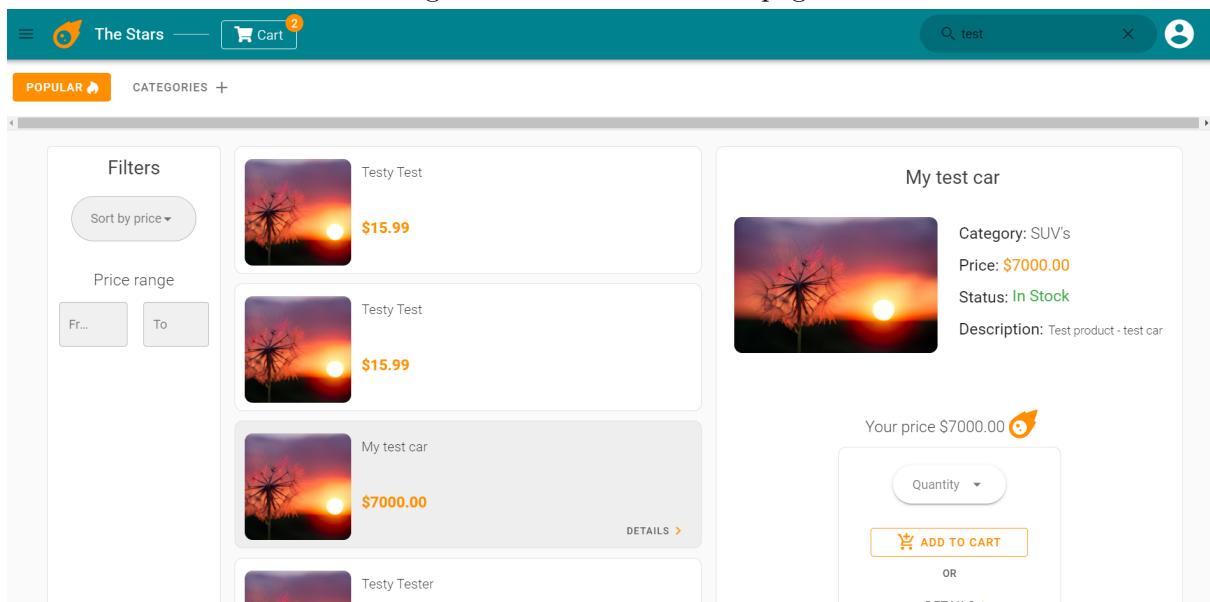
Below is an external interface screenshot of the Home page:

Figure 3.12.: Home website page



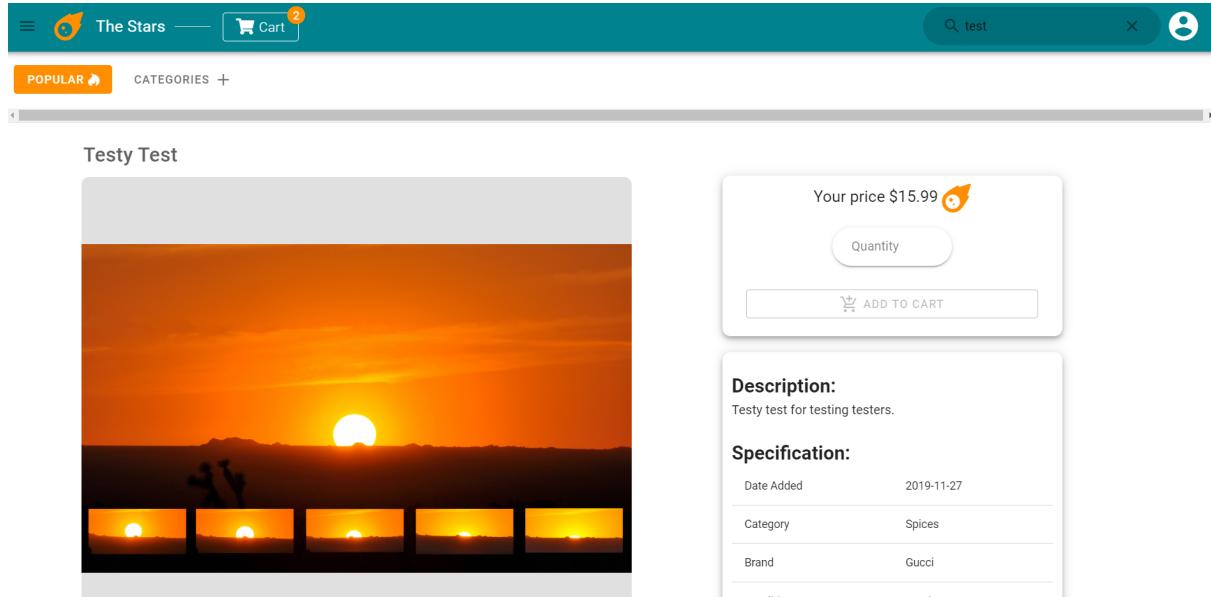
Below is an external interface screenshot of the Search page:

Figure 3.13.: Search website page



Below is an external interface screenshot of the Product page:

Figure 3.14.: Product Reviews website page



Below is an external interface screenshot of the lower section of the Product page showing Product Reviews:

Figure 3.15.: View Product Reviews website page

#### Product Reviews:

**Username:** L-Man

**Rating:**



I use this headset for business calls and am told the microphone quality is excellent. I find the speakers to be great for voice and good for music and effects. Obviously these are not reference headphones, but they are not lacking anything I need. I don't need booty bass, but there is some bass. I love the in-line mute and volume controls.

**Username:** R-Man

**Rating:**



Earlier today I couldn't get to the store on time because I could not find my keys. That caused me to miss the opportunity to run over a golf ball, which would have bounced between a few buildings in Makati and eventually land in one of the fish ponds at the park. Oh yeah and the product sucks.

Below is an external interface screenshot of the Shopping Cart page:

Figure 3.16.: Shopping Cart website page

Shopping Cart

 Dior J'Adore - Eau de Perfume 50ml - Used only a few Drugs	Quantity ▾	
 Come Back in a Few Beers Patch Beer Iron to Sew on Patch Badge Kitchen	Quantity ▾	
		<b>CHECKOUT</b>
Items(2)		\$789
Shipping		Free
Total		\$789

Below is an external interface screenshot of the Checkout page:

Figure 3.17.: Checkout website page

Pay with 

---

Listing 2 X 1	\$34.00
I like trains? X 2	\$8.00
Items (2)	\$42.00
Tax (15%)	\$6.30
Shipping	Free
<b>Total</b>	<b>\$48.30</b>
Shipping Address	
Line 1	
Line 2	
Country	State/Province
City	Postal Code
 PROCEED TO 	

Below is an external interface screenshot of the Write Product Review page:

Figure 3.18.: Write Product Review website page

This is a test review for a screenshot. Guess this product's worth a 4 out of 5!

Rating: 4

SUBMIT

The screenshot shows a user interface for writing a product review. At the top, there is a text box containing the placeholder text "This is a test review for a screenshot. Guess this product's worth a 4 out of 5!". Below this, there is a rating section featuring five blue circular icons, each with a white bomb-like symbol inside. The fourth icon from the left is filled with a light blue color, indicating it has been selected. Below the icons, the text "Rating: 4" is displayed. To the right of the rating section is an orange rectangular button with the word "SUBMIT" in white capital letters.

Below is an external interface screenshot of the Manage Account page:

Figure 3.19.: Manage Account website page

**Account settings**

- Edit profile
- Manage password
- Security
- About

First name  
Claire

Last name  
Shaw

E-mail  
claireshaw17@gmail.com

Current Password

SAVE

Saved shipping addresses

Address 1

The screenshot shows a user interface for managing account settings. On the left, there is a sidebar titled "Account settings" with four menu items: "Edit profile" (pencil icon), "Manage password" (key icon), "Security" (shield icon), and "About" (info icon). The main content area contains several input fields: "First name" (Claire), "Last name" (Shaw), and "E-mail" (claireshaw17@gmail.com). Below these is a "Current Password" field. A "SAVE" button is located below the password field. At the bottom, there is a section titled "Saved shipping addresses" with a dropdown menu showing "Address 1".

Below is an external interface screenshot of the Create Listing page:

Figure 3.20.: Create Listing website page

The screenshot shows a web-based form titled "Create a new product listing". The form is contained within a white rectangular box with rounded corners, set against a dark teal background.

The fields include:

- A text input field labeled "Product Name".
- A text input field labeled "Price" with a dollar sign (\$) symbol.
- A large text area labeled "Description".
- A dropdown menu labeled "Category".
- A dropdown menu labeled "Brand".
- A dropdown menu labeled "Condition".
- A text input field labeled "Quantity".
- A "CANCEL" button.
- An orange "CREATE" button.

Below is an external interface screenshot of the Admin Analytics (Management) page:

Figure 3.21.: Admin Analytics (Management) website page

The screenshot shows the 'The Stars' website's admin interface. The top navigation bar includes a logo, a 'Cart' icon, a search bar, and a user profile icon. On the left, a sidebar menu lists: Dashboard, Shopping Cart, Manage Account, Create Listing, and Admin Analytics (which is selected). The main content area has tabs for MANAGEMENT, SALES, and PROFITS. A sub-header 'Roper, Jorge (UtahTeapot)' is displayed above a form. The form contains fields for 'Admin Status' (checkbox), 'Email' (input field with value 'bearyrocks@gmail.com'), and 'Password' (input field). A 'SUBMIT CHANGES' button is at the bottom.

Below is an external interface screenshot of the Admin Analytics (Sales) page:

Figure 3.22.: Admin Analytics (Sales) website page

The screenshot shows the 'The Stars' website's admin interface, specifically the Sales section. The top navigation bar and sidebar are identical to Figure 3.21. The main content area has tabs for MANAGEMENT, SALES (selected), and PROFITS. A green header bar displays date ranges: '2019-12-01 ~ 2019-12-31' on the left, a 'GENERATE REPORT' button in the center, and 'from 2019-12-01 to 2019-12-31' on the right. Below this, a message states 'There are 42 sales for this period'. A green header bar labeled 'TOP 10 LEADER BOARD SELLERS (ALL TIME)' follows. A table lists the top 10 sellers with their ranks, usernames, and sales counts:

Rank	Username	Sales
1	DaikokuArwin	23
2	Hypenion98	7
3	gullaumerm	6
4	mc	6
5	DaikokuArwin2	1
6	clareshaw	1
7	NotDaikoku	1
8	quequeque	1
9	UtahTeapot	0
10	Qwertyulop	0

Below is an external interface screenshot of the Admin Analytics (Profits) page:

Figure 3.23.: Admin Analytics (Profits) website page

The screenshot shows a web-based admin interface for 'The Stars' website. At the top, there's a dark header bar with the site logo, a 'Cart' icon, a search bar, and a user profile icon. Below the header, a navigation bar has three main tabs: 'MANAGEMENT', 'SALES', and 'PROFITS'. The 'SALES' tab is currently selected. A date range selector shows '2019-12-01 ~ 2019-12-31'. In the center, a large bold text displays 'Total Revenue Is **286.59\$** For This Period'. Below this, a table titled 'Sales Details' lists individual profit entries. The table has two columns: 'Date Of Profit' and 'Profit Amount'. The data shows various dates from December 1st to December 4th, with profit amounts ranging from 0.24 to 36.36.

Date Of Profit	Profit Amount
2019-12-01	0.24
2019-12-01	0.69
2019-12-01	1.02
2019-12-01	0.69
2019-12-01	0.48
2019-12-01	0.48
2019-12-01	0.48
2019-12-01	9
2019-12-02	0.48
2019-12-03	1.02
2019-12-03	3
2019-12-03	1.02
2019-12-03	3.69
2019-12-03	210
2019-12-03	36.36
2019-12-03	15
2019-12-03	0.48
2019-12-04	0.48
2019-12-04	1.02
2019-12-04	0.48

### 3.3.3. Screen Objects and Actions

The following table (**Table 4.1**) documents the inputs and outputs of each of the previous front pages:

Table 3.1.: Front Pages Inputs and Outputs.

Page	Input(s)	Output(s)
Login	Fields: Email and password. Buttons: Continue, browse anonymously, and sign up for an account	Redirects to: Registration and Home.
Registration	Fields: First name, last name, username, email, password, and password confirmation. Buttons: Show/hide password, cancel and create.	Redirects to: Login and Home. Messages: 'A name is required', 'a username is required', 'an email is required', 'a password is required', 'a minimum of 8 characters is required', 'password content is not valid' and 'passwords must match.'
Home	Buttons: Cart, go back, popular, categories, 'account name', logout, dashboard, shopping cart, manage account, create listing, admin analytics (hidden), shop now, Men's Pants, Men's Shoes, Children's Clothes, Children's Toys, Parental Gear and Utilities, Music, Movies, Sports, Dry Foods, Drinks, and Spices. Drop-down Menus: Menu and account.	Redirects to: Login, search, account settings, and shopping cart. Buttons Displayed on Click: Sedans, SUVs, Motorcycles, Interior Design, Small Appliances, Large Appliances, Computer Related.
Search	Select Box: Sort by price. Fields: From and to. Buttons: Details, next page.	Lists: Items sorted by price range. Mouseover: Display item basic info and picture, selects quantity and to add to cart, and details.
Product Page	Select Box: Quantity. Buttons: Remove and Check-out.	Redirects to: Shopping cart.
Shopping Cart	Buttons: Remove and Checkout.	Calculates: Total cost of items dynamically.
Checkout	Fields: Address line 1, Address line 2, Country, State/Province, City, Postal Code Buttons: Proceed to PayPal	Calculates: Total cost of items including shipping and tax. Redirects to: PayPal payment portal
Reviews	Fields: review text Buttons: review score (out of 5), submit	Redirects to: Home page
Manage Account	Buttons: Edit profile, Manage password, Security, About	Fields displayed on click: First name, Last name, E-mail, Current Password, New Password, Confirm Password Buttons displayed on click: Submit Messages: 'a password is required', 'a minimum of 8 characters is required', 'password content is not valid' and 'passwords must match'.
Create Listing	Fields: Product Name, Price, Description, Category, Brand, Condition, Quantity Buttons: Cancel, Create	Redirects to: Product page, Previously-visited page Messages: 'A name is required', 'A price is required', 'A description is required', 'A category is required', 'A brand is required', 'A condition is required', 'A quantity is required'
Admin Analytics	Buttons: Management, Sales, Profits, Generate Report	Fields displayed on click: Email, Password, Date From, Date To.

## 4. Conclusion

In conclusion, 354TheStars is a program whose subsystems are built using a list of well-established development techniques and tools. It offers a fast, responsive and clean user interface thanks to the use of material design. The software allows the user to create an account, login and create product listings that they can upload to the site. Other users can view the product listings and decide whether to purchase the item(s). The system also allows the buyers to complete their transactions by using PayPal as the third-party payment manager. Once a user has purchased an item, they can revisit the product page to leave a comment and a score on the seller. A user can also modify their own account information such as their email, password, etc.

Unfortunately, we have encountered some difficulties during development. The most problematic one was our ability to handle the scope of the project in respect to the allocated amount of time. In other words, we found that there was too much to do and we were limited in our time to accomplish it. This resulted in several important features being non-functional, partially implemented or not implemented at all. An example of this is the administrator functionality, the entire administrator functions are implemented and operational on the back-end subsystem. This feature is partially implemented since it does not have an adequately functional front-end implementation. Other missing requirements that are partially implemented includes the following list:

- A seller's ability to reply to reviews.
- The ability to view seller's total review scores or a list of reviews on the seller's page.
- A seller's ability to edit their product listings.
- A trending algorithm to display items that are selling well over a predetermined period of time.
- A detailed list of transactions made by the user.
- The ability to save an item for later.

Additionally for similar reasons, several key requirements were not implemented at all. This includes, but is not limited to, filtering, sorting, a seller profile to edit pending shipments or transaction history, product advertisements, and more. Please refer to the **Traceability Matrix** for a more detailed list of the requirements and their current status. Nevertheless, the program offered a much needed and very welcomed learning experience that reflects the reality of the industry and the importance of organization and cooperation. The project allowed us to familiarize ourselves with many industry tools like LaTeX and GitHub while learning important and relevant skills. I believe those skills were applied properly to deliver a high quality program that is functional, albeit, incomplete.

# Appendices

## A. Minutes of Meetings

The following is a table (**Table A.1**) documenting the details of our major in-person meetings, including the dates, minutes, people, and subjects of discussion:

Table A.1.: Minutes of Meetings.

Date (2019)	Number of Minutes	Who Attended	What was Discussed
Sept 13	90	Michael, Steven, Nagib, Khanh, Olivier, Mark, Guillaume, Amrou, Ghislain, Mahdi	Met to discuss roles, languages, platforms for servers, design types, etc.
Sept 20	90	Michael, Steven, Nagib, Gheith, Claire, Olivier, Mark, Guillaume, Ghislain, Mahdi	Chose Agile, discussed Coding Conventions, roles, proposed meetings for Iteration 1, interview questions.
Sept 26	90	Michael, Steven, Nagib, Claire, Khanh, Olivier, Mark, Guillaume, Amrou, Ghislain, Mahdi	Decided on front-end colour palette, worked on Database Design, assigned roles for user stories and personas, and coordinated between roles to ensure all on the same page, covered legality doc.
Oct 3	90	Michael, Steven, Mark, Amrou	Did edits to SRS to trim size, and other related discussions, reviewed Amr's database design.
Oct 4	90	Michael, Steven, Claire, Olivier, Mark, Guillaume, Ghislain	Viewed and discussed front-end site development, discussed details of Guillaume and Amr's database design, did edits to SRS to trim size, discussed design and implementation of user stories for agile sprints, determined initial priorities for agile sprints.
Oct 11	90	Michael, Steven, Nagib, Claire, Olivier, Mark, Guillaume, Amrou, Ghislain, Mahdi	Shifted responsibilities of many people into front-end and back-end to ensure sprints go more smoothly.
Oct 18	90	Michael, Nagib, Claire, Olivier, Mark, Guillaume, Ghislain, Mahdi	Worked on sorting out Trello sprints and ensuring back-end is more productive, coordinating and communicative. Went over progress on front-end.
Oct 25	90	Michael, Steven, Claire, Olivier, Mark, Guillaume, Ghislain	Testing, New Sprints.
Nov 1	90	Michael, Steven, Nagib, Gheith, Olivier, Mark, Guillaume, Ghislain, Mahdi	Testing, New Sprints.

Nov 8	90	Michael, Steven, Nagib, Gheith, Claire, Mark, Guillaume, Amrou, Ghislain, Mahdi	Discussed prototype demo, arranged back-end meeting.
Nov 12	90	Michael, Steven, Claire, Mark, Guillaume, Amrou	Walkthrough by Guillaume of main SQLAlchemy functionalities used, clearing up back-end questions.
Nov 15	45	Michael, Steven, Nagib, Gheith, Claire, Khanh, Olivier, Mark, Guillaume, Amrou, Ghislain, Mahdi	Preparation for prototype demo, and prototype demo.
Nov 19	90	Steven, Nagib	Back-end development.
Nov 22	90	Steven, Nagib, Gheith, Claire, Khanh, Mark, Guillaume, Ghislain	Discussed Testing and Diagrams for Final Report. Discussed next programming steps.
Nov 25	90	Steven, Nagib, Amrou	Admin functionalities and implementation in back-end.
Nov 29	150	Michael, Steven, Nagib, Gheith, Claire, Khanh, Mark, Guillaume, Ghislain, Mahdi	Discussed issues implementing features: previous bugs, and ways to make current code ready for implementation.

## B. Mobile Cost Analysis Study

### B.1. Introduction

This section briefly covers the study's purpose and scope.

#### B.1.1. Purpose

The purpose of this study is to evaluate the possibility of adapting 354TheStars to be compatible on a mobile device. 354TheStars was designed as a website to be accessed from a computer browser, however, many customers prefer to navigate using their mobile devices. We will therefore analyze whether there is value in attempting to reach these potential customers.

#### B.1.2. Scope

The mobile development must ensure that the entirety of 354TheStars will be fully functional on any Android or Apple mobile device. The interface must also be pleasant to use and elegantly displayed despite the small screen of mobile devices.

Making 354TheStars available to use on mobile devices will allow buyers to shop from anywhere and at any time, and thus will allow sellers to stay in touch more frequently with their customers. This increase of traffic will in turn increase the revenue of the website. Additionally, many users may not even own a computer, so having a mobile website will further unlock access to additional revenue for our platform.

### B.2. Technical Analysis

354TheStars uses the Vuetify library, which allows for the website to be displayed responsively. The website is therefore able to be displayed correctly on hardware displays of most sizes (from stand-alone 4k monitors all the way down to 720p phone screens). Although 354TheStars was not designed to support very small window widths, most pages are already displayed in an elegant and functional fashion when accessing the website via a browser on mobile devices.

Since 354TheStars is already primarily functional on a mobile browser, creating a separate mobile version of our website from scratch is not needed, and focus can be given on increasing the responsiveness of the website to supporting smaller screen sizes.

### B.3. Issue Analysis

The table below (**Table B.1**) documents the potential issues and solutions associated with implementing a mobile website:

Table B.1.: Mobile Site Potential Issues and Solutions.

Issue	Solution
The header of the website does not fit inside the width of a mobile phone screen.	When displayed on a small resolution, header text must be removed, leaving only icons that open drop-down menus.
The logo takes too much space on the Registration page.	The logo must be a smaller size and displayed on top of the page.
The phone keyboard does not display the “@” symbol when typing in email fields.	The type of the email fields should be changed.
The category lists on the Home and Search pages are too long.	Display the categories using a drop-down menu.
The filter area of the Search menu takes too much space.	Display filter options using a drop-down menu available through a button in the top-left corner of the screen.
The Shopping Cart page is not centred.	Adjust the sections to be centred evenly when displayed on a small screen.
The Account Management page is too wide.	Display the details of a section after selecting it, hiding the other sections. Add a back button to return the focus back to the Account Management sections.

### B.4. Cost-Benefit Analysis

Most of the previously cited issues can be fixed quickly, however certain specific issues are expected to require more time to implement. Furthermore, as the project continues to evolve, more issues are anticipated to likely appear. Once 354TheStars is released, the earnings from the increased user base and website traffic is expected to immediately overwhelm the minor costs outlined in **Table B.2**:

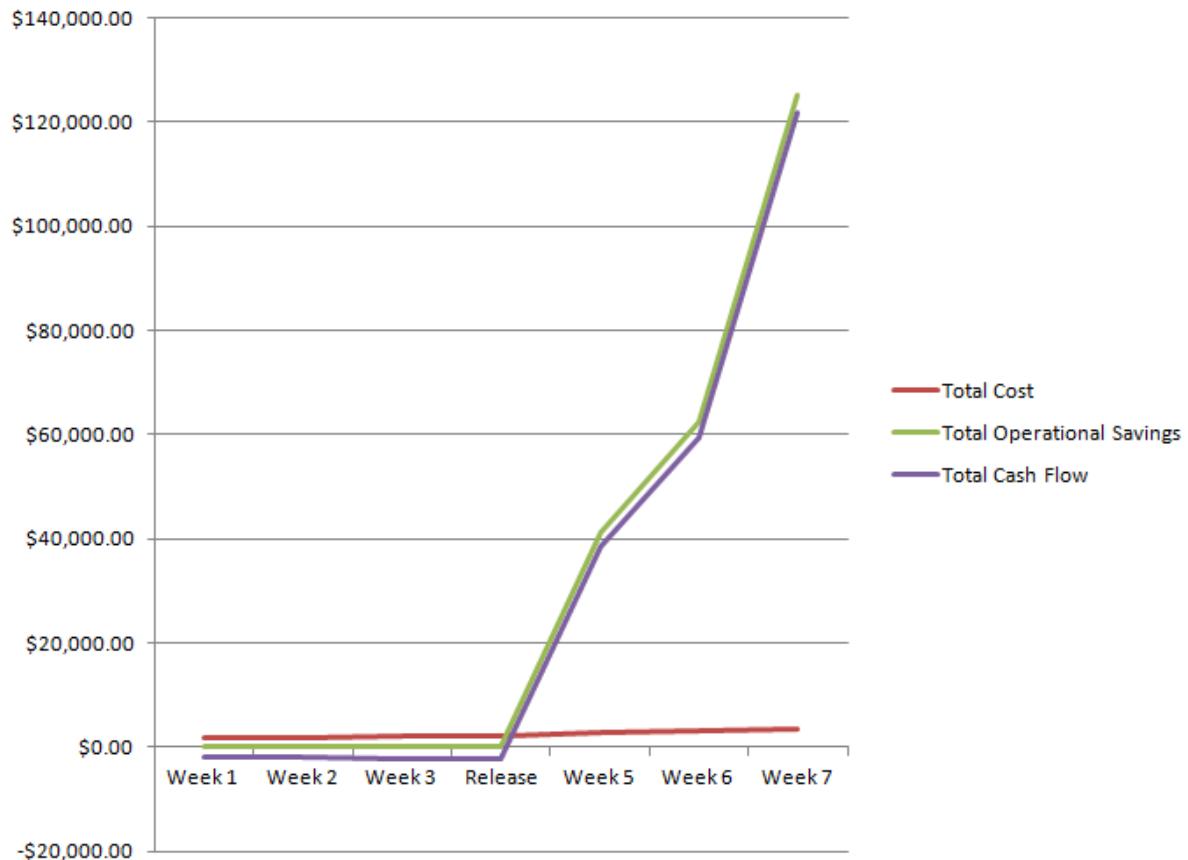
The following table (**Table B.2**) documents the costs of the potential issues associated with implementing a mobile website over a seven week period:

Table B.2.: Mobile Site Costs of Potential Issues over Seven Weeks.

Issue	Expected Time	Cost (\$ CAD)
General fixes	1 hour	60
Header	3 hours	180
Category list	5 hours	300
Filter	5 hours	300
Manage Account	10 hours	600
Maintenance	72 hours	4320
Total	96 hours	5760

The following Cost-Benefit Analysis chart (**Figure B.1**) outlines the total costs, cash flow, and thus the operational savings by implementing a mobile website over a seven week period:[1]

Figure B.1.: Cost-Benefit Analysis Chart



## B.5. Gantt Chart Detailing Implementation Phases

Below is a Gantt chart (**Figure B.2**) for the schedule of implementation phases involved in adapting the site to mobile over a seven week period:

Figure B.2.: Gantt Chart for Mobile Website detailing Implementation Phases[7]



## B.6. Conclusion

Due to 354TheStars already adopting a responsive design to support browsers on smaller computer screens, most of the work to make the website compatible with mobile devices has been completed. The only remaining steps required to complete this support are the previously presented issues. As a result, the costs in time and money would be very affordable and efficient, in comparison to the revenue this implementation would add to the website.

# Alphabetical Index

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# Glossary

**application programming interface** A set of functions and procedures allowing the creation of applications that access the features or data of an operating system, application, or other service[10].

**back-end** The part of a computer system or application that is not directly accessed by the user, typically responsible for storing and manipulating data[10].

**cost-benefit** Relating to or denoting a process that assesses the relation between the cost of an undertaking and the value of the resulting benefits[10].

**database** A structured set of data held in a computer, especially one that is accessible in various ways[10].

**drop-shadows** is a visual effect consisting of a drawing element which looks like the shadow of an object, giving the impression that the object is raised above the objects behind it.

**form factor** The physical size and shape of a piece of computer hardware[10].

**framework** A basic structure underlying a system[10].

**front-end** relating to or denoting the part of a computer system or application with which the user interacts directly[10].

**interface** Is a mark up language specially suited for scientific documents[10].

**library** A collection of programs and software packages made generally available, often loaded and stored on disk for immediate use[10].

**server** A computer or computer program which manages access to a centralized resource or service in a network[10].

**specification** (usually specifications) A detailed description of the design and materials used to make something[10].

**stand-alone** of computer hardware or software able to operate independently of other hardware or software[10].

**standardized open-source** an open-source interface, API or toolkit that has become an industry standard.

**toolkit** A set of software tools[10].

# Acronyms

**API** Application Programming Interface.

**ERD** Entity-Relationship Diagram.

**HTTPS** Hypertext Transfer Protocol Secure.

**IEEE** The Institute of Electrical and Electronic Engineers.

**JSON** JavaScript Object Notation.

**SDD** Software Design Document.

**SRS** Software Requirements Specification.

**UML** Unified Modeling Language.

# Bibliography

- [1] Rob Abdul. *Feasibility Study, Cost Benefit Analysis for your new eCommerce Website*. 2009. URL: <https://www.robabdul.com/business/feasibility-study-cost-benefit-analysis-for-your-new-ecommerce-web-site/>.
- [2] Matt Brian. *Google's new 'Material Design' UI coming to Android, Chrome OS and the web*. June 2014. URL: <https://www.engadget.com/2014/06/25/googles-new-design-language-is-called-material-design/>.
- [3] Vivian Cromwell. *Interview with Evan You*. Nov. 2016. URL: <https://web.archive.org/web/20170603052649/https://betweenthewires.org/2016/11/03/evan-you/>.
- [4] *Flask*. URL: <https://palletsprojects.com/p/flask/>.
- [5] Apache Software Foundation. *The Apache HTTP Server Project*. URL: <http://httpd.apache.org>.
- [6] *Gunicorn*. URL: <https://gunicorn.org>.
- [7] Tania H. *How to use a Gantt Chart for Website Development*. Sept. 2017. URL: <https://rubygarage.org/blog/gantt-charts-in-web-development>.
- [8] Ecma International. *ECMAScript® 2015 Language Specification*. June 2015. URL: <http://www.ecma-international.org/ecma-262/6.0/>.
- [9] *JSON*. URL: <http://www.json.org>.
- [10] Oxford University Press. *Lexico dictionary*. Nov. 2019. URL: <https://www.lexico.com>.
- [11] *Requirement Changes Interview with Dr. Hakim Mellah and Dr. Aiman Hanna*. personal communication. In-Person Interview. Oct. 2019.
- [12] *SQLAlchemy*. URL: <https://www.sqlalchemy.org>.