Software Requirements Specification

Specification

for

SmartShoppers System

Version 1.0

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Name	Date	Reason For Changes	Version
SW	2022/02/26	Initial Draft	1.0

1. Introduction

1.1 Purpose

The primary goal for this SRS is to document a complete and accurate list of requirements for the SmartShoppers online system. These are the software requirements for version 1.0. The SmartShoppers online system is required by a leading retail chain in Canada called ShoppersLand Inc. This document will provide the development team with specifications of the SmartShoppers online system. The development team will understand the needs of the stakeholders, the details of the product, and the requirements of the product through this SRS document. In this document, the whole software system will be covered which will comprise of components and subsystems.

1.2 Document Conventions

Higher priority requirements are ordered from top to bottom where the first requirement documented it has the highest priority in that section. The priority levels of requirements in this document are scaled by the following scale.

High = essential

Medium = important

Low = desirable

High priority requirements must be designed and built in the software as they are critical to the functionality of the software system. Medium priority requirements are important for the quality of the system but are not essential for the system to operate. The low priority & some of the medium priority requirements should be decided upon through various requirements prioritization techniques. These techniques would include quantitative and qualitative prioritization techniques. Priorities for higher-level requirements are assumed to be inherited by detailed requirements unless there is priority accompanying the requirement statement.

1.3 Intended Audience and Reading Suggestions

This document is intended for the development team of the SmartShoppers online system, as well as the stakeholders. The rest of the SRS gets more descriptive about the software system. Sections 3 to 6 detail the requirements of the system and covers the core of this document. These sections contain both the functional requirements which explain the function that the software system must perform, and non-functional requirements which describe the system's attributes. A developer is recommended to read section 2 to get a description of the software system to build,

and Sections 3-5 to understand the requirements of the SmartShoppers online system. Section 2 is a recommended read for the end users.

1.4 Product Scope

The SmartShoppers system is an online system that allows customers to find products in the physical retail stores with a greater precision. The main goal of the software system is to provide the customers with a faster and smooth shopping experience in store. SmartShoppers would allow customers to find the products that are available in a specific store and its location in the store. This product will have many benefits to the customer and the ShoppersLand Inc. The customer will have financial benefits as they are able to save money by being provided all the on-sale items. The customer also is able to find recommended products which they might not have had a chance to find in store. The customer saves time shopping because they know the exact locations of the products which they would like to purchase. ShoppersLand Inc. would benefit financially as they will sell more products because of the SmartShoppers online system. ShoppersLand's employees would also be able to work efficiently as they will be asked fewer questions by the customers regarding the products.

1.5 References

WCAG - Web Content Accessibility Guidelines https://www.w3.org/WAI/standards-guidelines/wcag/

Educaloi - Law regarding language requirements in Quebec

https://educaloi.qc.ca/en/capsules/language-laws-and-doing-business-in-quebec

2. Overall Description

2.1 Product Perspective

ShoppersLand Inc is a retail chain in Canada looking to allow customers to virtually browse their in-store products as a way to improve customers' shopping experience.

This means that customers can search for a store or find the nearest store (to a specified location or theirs) and see the availability of items at that store. They can create shopping lists and add available items to their shopping list. The shopping list will auto-sort by aisle to optimize customers' shopping time.

This system uses a database containing information regarding stores, each store has managers who can track and update their stores inventory. The entire system is overseen by administrators who have the same privileges as managers in addition to the ability to add and remove managers.

Customers select the store nearest a location of their choice and can browse the items available at that store, search for specific items or view items that are on sale and add them to their shopping list.

2.2 Product Functions

The following is a list of functions that the system will provide:

Customers:

- The ability to sign up.
- The ability to log in.
- The ability to log out.
- The ability to find nearest stores based on current location.
- The ability to find stores based on inputted location (max 50km).
- The ability to save locations.
- The ability to search for items by name.
- The ability to view item information.
- The ability to search by category.
- The ability to shop by category.
- Sale items are in a Sale category and in their usual category.
- The ability to add items to the shopping list (quantity > 1).
- The ability to remove items from the shopping list.
- The ability to view shopping lists (sorted).
- The ability to view recommended items list (based on their current shopping list)

Managers:

- The ability to add Items
- The ability to remove items
- The ability to modify items
- The ability to modify sale item list

Administrators:

- The ability to add Items
- The ability to remove items
- The ability to modify items
- The ability to modify sale item list
- The ability to add/remove Managers

2.3 User Classes and Characteristics

Customer

Customers are individuals part of the general public. They require the ability to view the website, login/logout, select a store, browse store inventory, interact with shopping lists, add/remove items to/from their shopping list and to view their shopping list.

Manager

Manager's have the ability to update item information in inventory as well as update items' stock count for the stores they manage. They also require the ability to put items on sale for a chosen amount of time.

Administrator

The administrators role is to manage the overall system including managing the managers, stores and items in stores. This means they need the ability to add/remove and edit the aforementioned groups.

2.4 Operating Environment

Since the primary users of the system are customers of a grocery store, a general audience, a wide range of popular web browsers should be compatible with the system. Moreover, the website should be operating system agnostic and function with any modern operating system for both desktops and mobile devices. At a minimum, the system should run on Linux, Windows, Android, iOS and Mac operating systems provided they are up to date and are not legacy operating system versions. Provided is a detailed description of the operating systems that should be able to run detail descriptions about the operating systems that the system can operate functionally:

- Macintosh (Mac OS X or greater).

- iOS (10+)

- Android (10+)

- Microsoft Windows (7+)

- Linux (Ubuntu, CentOS etc.)

Web browsers that the system should be compatible with:

- Mozilla Firefox

- Google Chrome

- Safari

- Microsoft Edge

- Samsung Internet

2.5 Design and Implementation Constraints

If this product must be available in Quebec at the time of launch it must have a French translated version of the website in accordance with the *Charter of the French Language (educaloi)*.

There are no limits to the technologies used as long as they meet security standards and are capable of performing the required tasks. The manager may use a different application to access and update store database information.

There are only two pieces of information being communicated that require security considerations. One, the login information. Which should be implemented according to industry standard or using verified, secure 3rd party systems e.g. oauth. The second is the browsing information, customers browsing trends, which when collected should not include identifiable customer information (anonymize data).

2.6 User Documentation

Navigation and use of the system should be straightforward. However, a help section with a Frequently Asked Questions section and a way to report an issue such as an email address or a form should be present.

2.7 Assumptions and Dependencies

We assume that managers, customers and administrators are using the same website. There is no assumption of third-party or commercial components being used at present, the document will be modified if this changes.

3. External Interface Requirements

3.1 User Interfaces

The SmartShoppers GUI requires the use of a web browser for any user or device. The GUI will be automatically scaled to the size of the users' screen for mobile devices, or resized to the window for PC users, should the user change window size the GUI will automatically rescale. The web-based interface will provide forms of accommodation for users with disabilities, including but not limited to: screen-reader functionality, user colour customization, on-screen keyboards.

Every screen will have a link for customers to view their shopping list. The shopping list link will be in the form of a button, when the button is clicked the shopping list will take up the entire screen of the device.

3.2 Hardware Interfaces

The SmartShoppers System will be a web-based service. Supported operating environments are listed in Section 2.4. Normal users will not be able to change the system's databases, rather they will only be able to access information through the interface by providing inputs (items, locations, log-ins).

3.3 Software Interfaces

The SmartShoppers System will save users' shopping lists as items are added, this is for user convenience and accommodates for the event that users may leave part way while creating their lists (internet disconnections, intentionally closing the page and coming back to it later, etc.). Inputs from the users will mainly come in the form of searching items, the output of the system will be information pertaining to the item, or an error message if the item does not exist, or is out of stock.

3.4 Communications Interfaces

The system must be accessed by using one of the supported browsers (see Section 2.4 for details). Users will be prompted for a log-in to access their accounts, first time users will be provided with an electronic form to fill out. This information will be stored in the database. Sensitive information including but not limited to: passwords, e-mail addresses must be encrypted to

prevent security breaches and hacking. The database must have an up-time of 98% of the year, with downtime being allotted for scheduled maintenance. The database must update in real-time when new items get added or existing items get changed/deleted.

4. System Features

This section will discuss in more detail about the main requirements of the SmartShoppers Online System for all defined users in section 2.1.

4.1 User Authentication

4.1.1 Description and Priority

Before accessing the system and utilizing any functionality and service that the system provides, users must initiate a registered identity in the system and access the system through authentication measures. Any failure should direct the users to the accordingly section for further registration or logging. This feature is considered High Priority.

4.1.2 Stimulus/Response Sequences

When users come to the online system and want to save a specific store in the system, the login section of the system should appear and ask users to enter an identifier and a password. If it is a new user, the user can access the registration form with an action and create the account. After that, the system would presume the current activity of the user.

4.1.3 Functional Requirements

4.1 - Req 1: Each user must identify self.

Priority: High

4.1 - Req 2: New users must create an account in the system for the system to provide its service, mainly to save the stores' location.

Priority: High

4.1 - Req 3: The system must display proper warnings when an user fails to access the system.

Priority: High

4.2 User Profile

4.2.1   Description and Priority

Users with different authority must have the ability to customize their profile/account within the system. In detail, users can access and modify personal information, store preferences and security in the profile. This feature is considered High Priority.

4.2.2   Stimulus/Response Sequences

Each user would be able to identify the profile in the online system. In the profile, the system would present the fundamental features such as security and personal information modification as well as supported features like store's location for preferences. The system would ask for confirmation and update the user's profile based on the actions the user takes in the profile.

4.2.3   Functional Requirements

4.2 - Req 1: Each user must have the ability to change the account identifier and password.

Priority: High

4.2 - Req 2: Each user must be able to establish security methods for further use of the system.

Priority: High

4.2 - Req 3: Each user must be able to view and modify the preferences of store location.

Priority: High

4.2 - Req 4: Each user can request for personal information and account deletion from the system.

Priority: High

4.3   Resource Management

4.3.1   Item Management

4.3.1.1   Description and Priority

Users with the appropriate privilege (managers and administrators) can manage the items that are presented in the online system. In detail, they will have the authority to add and remove items

from the system; modify, update items' availability and the number of items in inventory; arrange categories and update lists of sale items. This feature is considered High Priority

4.3.1.2   Stimulus/Response Sequences

When the user performs any action from adding, removing and updating items, the system would ask the user for confirmation, connect to the external databases from the main system and proceed the instructions. After executing the instructions, the system would then present the user with the current state of the item management after the changes.

4.3.1.3   Functional Requirements

4.3.1 - Req 1: All managers must have the authority to add, remove and update the items from the system to the store they are assigned.

Priority: High

4.3.1 - Req 2: All managers must have the ability to update the items' availability in the store they are assigned.

Priority: High

4.3.1 - Req 3: All managers must have access to the lists of sale items in the system and have the authority to modify the items in the lists from the system to apply on the store they are assigned.

Priority: High

4.3.1 - Req 4: All administrators can interact with the items in every store any operations that the managers can perform.

Priority: High

4.3.2 Store Management

4.3.2.1   Description and Priority

Users with appropriate privilege (managers and administrators) can update the relevant information about the stores of which SmartShoppers Inc. is in charge. Moreover, they can update the fundamental information of the store, for instance, opening and closing hours, the store's map with each item categorical section. For administrators, they can modify the list of stores within the system, including their locations. This feature is considered High Priority.

4.3.2.2   Stimulus/Response Sequences

Accessing a specific shop would display all relevant information of the store. If the user chooses the option for modification, the system would change the read-only mode into editable-mode and the user can change the information within that particular store. After the user confirms the changes, the system would then save the change and direct the user back to the store's view.

4.3.2.3 *Functional Requirements*

4.3.2 - Req 1: All administrators must have the ability to add and remove a specific store within the system.

Priority: High

4.3.2 - Req 2: All administrators must have the ability to update the stores' availability, opening and closing hours within the system.

Priority: High

4.3.2 - Req 3: All administrators must have the ability to update the store's map along with the categorical sections inside the stores within the system.

Priority: High

4.3.2 - Req 4: All managers must have the ability to update the availability, opening and closing hours of the specific store they are in charge of.

Priority: High

4.3.2 - Req 5: All managers must have the ability to update the map of the store of which they are assigned along with the categorical section inside the store.

Priority: Medium

4.3.3 Human Resources

4.3.3.1 *Description and Priority*

The system along with users with the highest privilege (administrators) can add and remove managers within the system. Furthemore, the system can grant privileges to managers to access and update other resources within the system as long as they have granted permission.This feature is considered High Priority.

4.3.3.2 *Stimulus/Response Sequences*

If administrators add a manager into the system, the system would create an account, grant that account with the access privilege for item and store management. Then the system would display the identifier and temporary password to the administrators.

If administrators remove a manager from the system, the system can either revoke the privilege from the manager's account or delete the manager's account from the system.

4.3.3.3 Functional Requirements

4.3.3 - Req 1: The system as well as the administrators must be able to add, remove and update managers for a specific store.

Priority: High

4.3.3 - Req 2: The managers who are removed by the administrator must have no access to the system management for items and stores.

Priority: High

4.3.3 - Req 3: The managers whose store is modified by the administrator must only have the access to all functionalities of the latest store and have no access to the functionalities of the previous stores.

Priority: High

4.4 Online Service

4.4.1 Store Look-up & Preferences

4.4.1.1 Description and Priority

Customers can interact with the system on finding and saving SmartShoppers' stores. In detail, after the system requests users to provide a real location (street name and number, postal code, city, country), customers must be provided with a list of nearest available stores to the given location. Moreover, customers can save stores' location for further use as well as changing the current store to another store while visiting it. This feature is considered High Priority.

4.4.1.2 Stimulus/Response Sequences

Entering the location would trigger the system to present the customer with a list of nearby stores. Accessing a particular store would direct the customer to that store. When the customer performs the Save option, the system would save the store's location to the customer's account if the customer has logged into the system; if not, the system would direct the customer to the login site beforehand.

4.4.1.3 Functional Requirements

4.4.1 - Req 1: Customers must have the ability to search for the available stores within the identified range from the location that customers provide the system.

Priority: High

4.4.1 - Req 2: Customers must have the ability to save and unsave the store's location for preferences.

Priority: High

4.4.1 - Req 3: Customers must be able to change the store's location at any time during their visit to the online service of the system.

Priority: High

4.4.2   Item Search & View

4.4.2.1   Description and Priority

Customers can search and view items within a specific store that they have chosen before using the system. Specifically, customers must be able to search for items through some criteria such as item name or category. Accessing an item will show the customers the detailed description about that item, for instance, the name and description, the price and size of the item. This feature is considered High Priority.

4.4.2.2   Stimulus/Response Sequences

Entering the text for the potential item name in the system would synchronously display a list of items whose name contains the text synchronously on the system textbar. Accessing a specific item would direct customers to the item's information page.

For category, customers would access the Section feature to access all categorical sections within the stores. When customers choose a section, the system would generate a list of items with that chosen category and display the list to the customers.

4.4.2.3   Functional Requirements

4.4.2 - Req 1: All customers must have the ability to search for items according to some criteria given a specific store within the system:

4.4.2 - Req 1.1: Customers must be able to search for items by name.

Priority: High

4.4.2 - Req 1.2: Customers must be able to search for items by category.

Priority: High

4.4.2 - Req 2: The system must show the relevant information of an item when customers access that item:

4.4.2 - Req 2.1: The name and description of the item

Priority: High

4.4.2 - Req 2.2: The price and size of the item.

Priority: High

4.4.2 - Req 2.3: The availability of the item.

Priority: High

4.4.3 Shopping List

4.4.3.1   Description and Priority

Customers can modify the shopping list while they are searching for items during their visit to a specific store within the system. The content of the shopping list must also be updated accordingly when customers change the store's location. Furthermore, the shopping list should be saved and remains unchanged when customers log in or out of the system. This feature is considered High Priority.

4.4.3.2   Stimulus/Response Sequences

When the customer adds or removes an item in the shopping list, the system would update the content of the list accordingly. Whenever the customer logs into the system and searches for stores and items, the system would present the latest shopping list that the customer has created and modified before from the previous login.

4.4.3.3   Functional Requirements

4.4.3 - Req 1: The system must initiate a shopping list when customers choose a specific store within the system.

Priority: High

4.4.3 - Req 2: Each customer must have the ability to add and remove items to the shopping list when using the system.

Priority: High

4.4.3 - Req 3: The items in the shopping list must be saved and remain the same while the availability of the item should be updated accordingly in the system in the following scenarios:

4.4.3 - Req 3.1: customers' log in and log out.

Priority: High

4.4.3 - Req 3.1: when customers are inactive for a period of time.

Priority: High

4.4.3 - Req 3.2: when customers change the location of the store.

Priority: High

4.4.4   Best Shopping Order

4.4.4.1   Description and Priority

Given the shopping list and the store the customer is accessing, the system should suggest the customers with sufficient and efficient solutions to get the order of the items in the list such that when customers are coming to the store, they can collect the items within the relatively short amount of time. This feature is considered High Priority.

4.4.4.2   Stimulus/Response Sequences

Given the current shopping list and the store that the customer is accessing within the system, when the customer chooses this option, the system would take in the shopping list from the customer, the shopping area of the store from the databases and conduct the best solution for the order of the shopping list. Once the computation completes, the system would display the shopping list with the calculated order to the customer.

4.4.4.3   Functional Requirements

4.4.4 - Req 1: The system must have the ability to generate solutions for shopping orders to achieve the possible shortest amount of time for customers during their visit at the specific store. The generators will collect information based on the following aspects:

4.4.4 - Req 1.1: the store that the customers are visiting along with the internal structure of the store as described in the system at the current time.

Priority: High

4.4.4 - Req 1.2: the shopping list that the customers have created and modified at the current time.

Priority: High

4.4.4 - Req 1.3: the density of people in the specific store at the time the customers want to visit.

Priority: Low

4.5 Recommendation

4.5.1 Description and Priority

The system must be able to generate and display the special items (sale items or suggested items) to the customers while they are accessing the service within the system. In detail, the system generates the sale items and the administrator can review the lists for modification. The system would update the lists of sale items after the review or a certain amount of time. For the suggested items, the system will run the algorithm to generate the suggested items based on the store's location and the shopping list. This feature is considered High Priority.

4.5.2 Stimulus/Response Sequences

When the customer visits the online service system, a list of sale items would be displayed appropriately with the services provided by the system.

When the customer chooses a store to search for items, a list of suggested items would appear along with the shopping list.

4.5.3 Functional Requirements

4.5 - Req 1: The system must have the ability to generate the list of sale items for a specific week from the system's resources and display the list to customers who are accessing the system.

Priority: High

4.5 - Req 2: The system must have the ability to display a list of suggested items regarding to the following features:

4.5 - Req 2.1: The current store that the customers are accessing within the system.

Priority: High

4.5 - Req 2.2: Items that are not in the customer's shopping list and searched by the others whose shopping list contains some of the items in the specified customer's shopping list.

Priority: High

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4.5 - Req 2.3: The frequency of an item being searched by customers during a period of time (the current week or the current month).

Priority: High

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Listed below are performance required, alongside the rationale for these requirements.

5.1.1: Account creation should not take longer than 2 minutes. This is because any longer and it will have a detrimental effect on our ability to retain customers.

5.1.2: Menu responsiveness less than 500ms. Any action should have relatively immediate feedback, if the process cannot be completed displaying a loading icon is acceptable. This is so users know that the system is functioning and optimizes the user experience.

5.1.3: Server response time should be less than 1000ms. Users should not have to spend much time waiting to add items to their shopping lists. Having a low server response time is ideal and creates a positive user experience.

5.1.4: Shopping list can be resumed after the customer logs back in. If a customer moves from desktop to mobile because they're at the store they should be able to see their shopping list so they can follow our shopping path.

5.1.5: Limit maximum customer inventory requests to 1 request per second. Increase database reliability/security

5.2 Safety Requirements

5.2.1: Include a banner if there are any exceptional safety requirements such as natural disasters or a pandemic (wherein customers should be notified to adhere to local laws e.g. wear masks, social distance).

5.3 Security Requirements

5.3.1: The application should authenticate all users.

5.3.2: Passwords stored in the database must be encrypted.

5.3.3: Third party APIs must be kept up-to-date for security purposes to mitigate abuse of known vulnerabilities.

5.3.4: Set maximum query to store inventories to 1 query per second in order to minimize DoS attacks.

5.3.5: Staff training on handling of users private information.

5.4 Software Quality Attributes

5.4.1: Availability: Is a priority, systems that are less than 5 years old should be able to use this system whilst meeting all testable requirements mentioned in this document.

5.4.2: Correctness: Inventory, Stores and the Shopping list must be correct; Inventory should be updated hourly.

5.4.3: Reliability: System should have an uptime of at least 99.5%

5.4.4: Maintainability: The system may be maintained by another party after development, track what third party dependencies are used and document the code properly.

5.4.5: Portability: The system being designed is a website which should be accessible anywhere, the server does not need to be portable.

5.4.6: Usability: User Interface should be made with ease of use in mind; A new customer should be able to add to their shopping list from login in less than 5 minutes with no prior experience.

5.4.7: Testability: The system components should be testable in a developers environment.

5.4.8 Robustness: The product must be capable of handling increased volume during holiday seasons; at least 100 simultaneous customer processes

5.5 Business Rules

5.5.1: Administrators are managers of managers and have the same permissions of a manager in addition to the ability to add/remove managers.

5.5.2: Customers are not able to view other customers shopping lists or personal information.

5.5.3: Customers must have the ability to change their preferred store and preferences.

5.5.4: Customers must have the ability to search for items across SmartLand's stores.

5.5.5: Managers must be able to update store hours, layout and store details.

5.5.6: Customers must have a unique email address.

5.5.7: Managers are assigned to a single store.

5.5.8: Managers can put items on sale and set prices depending on size.

5.5.9: Users must register before being able to use the system.

6. Other Requirements

6.1 Database Requirements (optional)

Information such as store inventory, user accounts and personal information are stored on the database. This information must be secure from data breaches and hacks. The database must also support being accessed by at least 100 users simultaneously. As SmartShoppers continues to expand its offerings the database must also support the increased volume. The database must support a volume of data of at least 10TB/day. The database should also support streamed video content so that Smartshoppers may run ads or video descriptions.

6.2 Legal Requirements

ShoppersLand Inc. brand and logo are trademarked. The use of trademarked logos on the application must comply with fair use. The product images and descriptions must also match the product being sold in store to meet legal requirements. The SmartShoppers application is presented as is and is not responsible for inventory errors. A Terms of Service document should also be present to limit liability.

6.3 Compatibility Requirements

ShoppersLand Inc. manages multiple stores and the SmartShoppers application must be supported for all participating stores. The SmartShoppers application must be compatible across the various store's inventory systems and store layouts.

6.4 Accessibility Requirements

SmartShopper's customers are varied and may require different accommodations while using the application. The application must be developed to allow future accessibility features to be implemented such as: text-to-speech, image captions, color-blind friendly interface and keyboard shortcuts.

6.5 Compliance Requirements

SmartShopper will be used in both personal computer (browser) and mobile platforms. The application must legally meet or exceed compliance standards such as the Web Content Accessibility Guidelines (WCAG). For mobile platforms, the application must comply with Google and Apple app store standards

A. Definitions and Abbreviations

A.1 Definitions

Users generally refers to all possible users of the system, or a specified subset of users of the system.

A.2 Acronyms

GUI - Graphical User Interface
PC - Personal Computer
WCAG - Web Content Accessibility Guidelines
DoS - Denial of Service