Assignment 1 - Requirements Specifications

Topic: Online Electronics Store (AWE Electronics - Online)

Introduction

This specification document is for a Online Electronics Store system that will assist AWE Electronics in expanding its operation online and tasks regarding the selling process, managerial and statistical functions.

This document serves to cover the requirements and quality attributes of the Online Electronics Store for AWE Electronics, namely through the analysed functional requirements that have been separated into user tasks, using the Tasks & Support approach.

Project Overview

The store owners of AWE Electronics have expressed an interest in expanding their operations online. Their current system is operating a local store situated at Glenferrie Road, limiting their reach to nearby suburbs encompassing the area. For this reason, the store owners of AWE Electronics have contacted Swinsoft Consulting to assess and develop the specifications required for a new Online Electronics Store system that will extend their reach to customers Australia-wide.

The document is a requirements specification for the Online Electronics Store for AWE Electronics, using the Tasks & Support approach, in order to better assess the required development efforts (as well as associated costs).

Goals

The goal of the document is to lay out domain-level requirements (i.e. the tasks that users want/need to perform with the support of the envisaged online store). Furthermore, taking the identified user tasks as well as the application domain into consideration, identify and appropriately specify four quality attributes (i.e. non-functional requirements) that we consider being particularly important for the Online Electronics Store.

Assumptions

- The delivery range of the OES (Online Electronic Store) is only within Australia.
- The OES is ready for service as soon as it is completed.
- Payment made in the OES is through Australian bank cards only.
- There are only two types of accounts in the OES:
    - The owner account which is unique and set up from the beginning.
        - Only one owner account can modify the products list at a time.
    - The customer account is created and accessed whenever a customer wants to buy something.

    - Each customer account is distinguished through the phone number registered which must be an Australian number and there is no restriction over the number of customer accounts that can be made within the store.
- There are no classifications over the products sold in the OES and they will all be considered electronic products in general, organized in alphabetical order.

Scope

The scope of the project is to create an online platform where customers can access and make orders for the products displayed within the store and the owner can make changes to products displayed and look at statistics over the number of products sold. This means anything outside the scope such as allowing and maintaining the platform to be displayed online, managing the products stock or in this case, creating an actual payment system getting money from the customers' bank account.

Problem Domain

Pain Points

- Prevent access to one account from multiple sources.
- Record customer's information and orders.
- Fulfill the privileges of the owner.

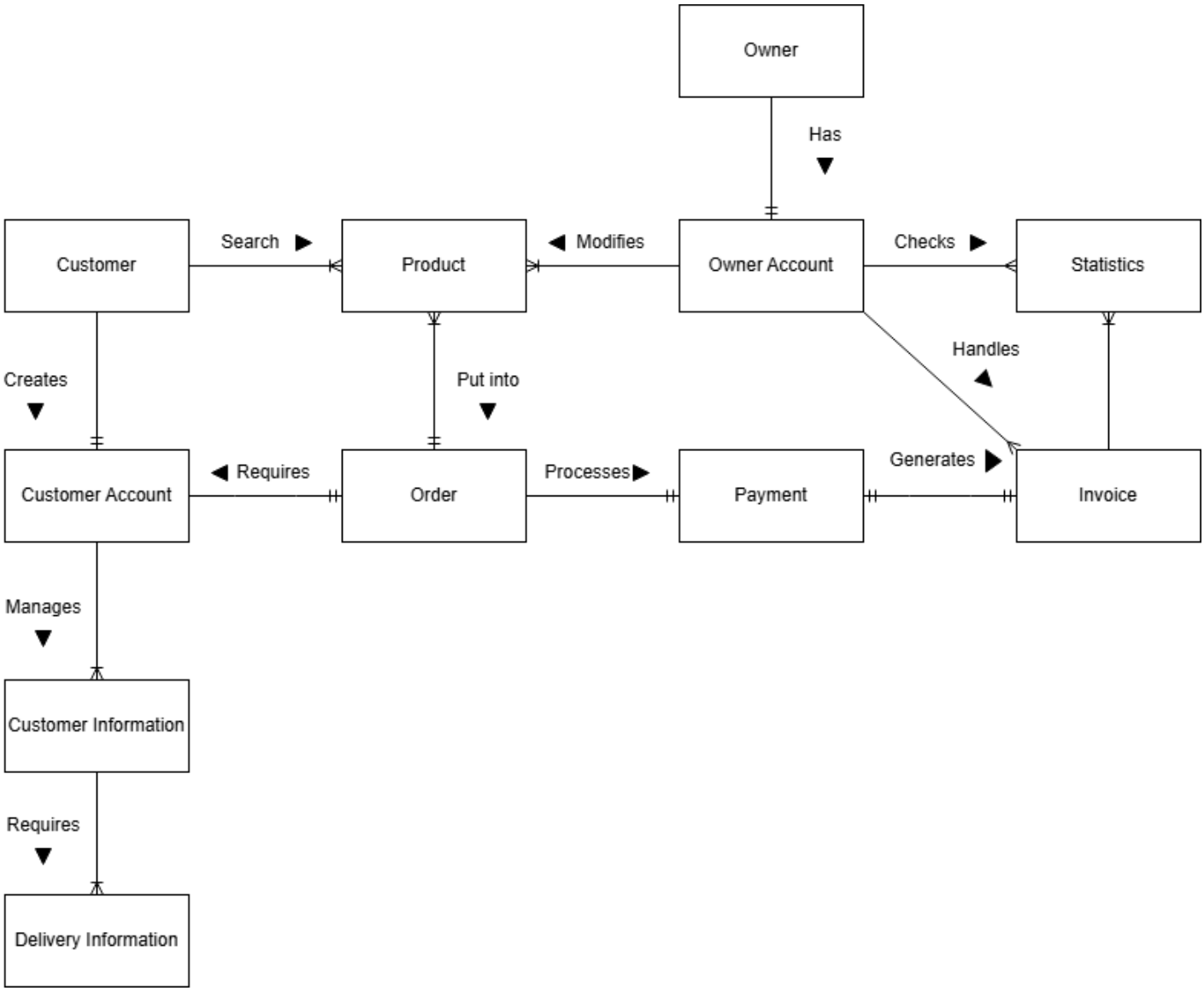
Domain Entities

- Customer
- Owner
- Product
- Order
- Invoice

Actors

- Customer
- Owner

Domain Model



Domain Vocabulary

- Owner: The person who sells products in the store.
- Customer: Anyone who is not the owner and wants to buy the products in the store.
- Product: Anything sold in the store.
- Order: A list of products that the customers have the intention to buy and is changeable until the customers decide to place the order.
- Account: An arrangement with the store that allows the user to do a range of functions equipped for them.

- Customer Information: Details about the customer including their name, gender, age and so on
- Delivery Information: Details about the destination to deliver the paid products of the order.
- Invoice: A list of products that have been paid, work that has been done, etc., showing what customers have done to place the order.
- Statistics: Numbers about products sold over different periods of time.

Tasks

1. Create a customer account
2. Manage customer's information
3. Search the desired product
4. Select products and manage the order
5. Process payment for the order
6. Manage the delivery information of the order
7. Change the displayed products
8. Show basic statistics about the goods sold

Functional Requirements and Task Descriptions

Task 1: Create a customer account

Task: Create a customer account	
Purpose:	Allows the customer to proceed with the purchasing process.
Trigger/Precondition:	The customer has expressed interest in a product and wishes to purchase it.
Frequency:	Average of 3 sign-ups per day.
Critical:	A sudden influx of sign-ups (15+).
Work Area:	Sign-up Page.
Subtasks:	Example Solution:
1. Customer navigates to the Sign-Up page.	System redirects the customer to the Sign-Up page.

2. Customer enters account creation details. Problem: Details entered (email or phone number) is invalid. Problem: An account already exists under the entered email address.	System verifies the email and phone number. System will also check that the password is secure. System will notify the customer that an account already exists under that email address.
3. Submit account creation information.	System writes the new account details into the database.
4. Customer logs into the new account.	System activates the newly created account.
Variants:	Example Solution
None	

Task 2: Manage customer's information

Task: Managing customer's information	
Purpose:	Customer ensures that their account details and shipping address are correct.
Trigger/Precondition:	The customer wishes to update/change their account details.
Frequency:	Average of 2 updates per day.
Critical:	A sudden influx of account updates at once (15+).
Work Area:	Customer Profile.
Subtasks:	Example Solution

1. Customer navigates to their Account Details page. Problem**:** Customer is not yet logged in.	System redirects the customer to their Account Details page. System will omit additional options to be selected prior to being logged in.
2. Customers select and update their details. Problem**:** Invalid details have been provided (email, shipping address or phone number)	System verifies the new changes before allowing them to be saved. System highlights errors and prevents saving until resolved
3. Save changes.	System updates the database with the changes made.
Variants:	Example Solution
None	

Task 3: Search for the desired product

Task	Details
Purpose:	To provide customers with a seamless and intuitive search experience, allowing them to find products quickly and accurately, thereby enhancing user satisfaction and engagement.
Trigger/Precondition:	Initiated when a customer wishes to locate a specific product or category within the online store. Requires an active internet connection and access to the store's website or application.
Frequency:	This function is expected to be used frequently, with an average of 20 search operations per day.
Critical:	An unusually high number of simultaneous search queries (e.g., 50+ at once) may impact system performance, leading to slower response times. Implementing performance optimization and load management strategies is essential to mitigate this risk.
Work Area:	Search bar
Subtasks	Example Solution

1. Enter product keyword in search bar	System displays suggestions in dropdown (auto-complete or popular terms)
2. Apply optional filters	System shows options to filter by brand, price, etc.
3. Submit search	System queries the database and shows matching results
4. Browse search results	System paginates results and shows product info (name, image, price)
Variants:	Example Solution
None	

Task 4: Select products and manage the order

Task	Details
Purpose	To provide customers with a flexible and user-friendly interface for adding products to their shopping cart, managing item quantities, and ensuring order accuracy, thereby enhancing the overall shopping experience.
Trigger/Precondition	Triggered when a customer decides to purchase one or more products after searching or browsing the online store. Requires the customer to be logged into their account.
Frequency	Occurs with each customer purchase, averaging around 15 product selections per day.
Critical	A sudden influx of concurrent item selections or order updates (e.g., 30+ customers adding products simultaneously) may cause inventory update delays or system strain. Implementing efficient inventory and order management mechanisms is crucial

	to handle such peaks.
Work area	Shopping cart
Subtasks	Example Solution
1. Add a product to the order	Adding a product to the cart and updates the counts
2. Open the order	Displaying the current order with items, prices and total amount
3. Change the quantity of a product	System recalculates totals and verifies stock availability
4. Remove a product in the order	System removed the product from cart and update the total
5. Save the order	System maintains cart across sessions (e.g., via cookies or user session)
Variants:	Example Solution
None	

Task 5: Process payment for the order

Task	Details
Purpose	Allow the customers to start the process of placing the order in the store.
Trigger/Precondition	1. After the customers have decided everything they want to buy and are ready to place the order. 2. There must be at least one product in their orders.
Frequency	Occurs every time a customer is ready to place an order (approximately 10+ per day)
Critical	30 orders are placed at a similar time which may result in delays
Work Area	Customer Order
Subtasks	Example Solution
1. Customers decide to place the order	The system gives customers the option to

Problem: Unable to place order	place the order The customers can place the order through other means such as calling or going to the shop directly which is outside the scope of this project.
2. Customers check the order for one last time	The system shows the unchangeable order before giving the customers the option to go back or continue
3. Customers enter the customer information	The system gives customers the option to either use their existing customer information or enter a new one
4. Customers enter the bank card information for payment	The system requires the customer to enter every required bank card information to complete the payment
Variants:	Example Solution
None	

Task 6: Manage the delivery information of the order

Task	Details
Purpose	Verify the precision of delivery information to effectively fulfill customer orders.
Trigger/Precondition	A customer places an order and enters delivery details.
Frequency	Occurs every time an order is placed (approx. 25 times daily).
Critical	Failure to promptly update delivery information could lead to complications in the shipping process (approximately 50+ delivery information being entered at around the same time)..
Work Area	Admin Dashboard & Customer Profile.
Subtasks	Example Solution
1. Customer enters shipping details.	The system checks the accuracy of the

Problem: Invalid delivery details are entered	address, and the customer provides confirmation. System highlights invalid fields in red with tooltip: "Australian postcodes must be 4 digits"
2. Confirm delivery details. Problem: delivery issues occur (unreviewed confirmations, high-risk addresses, or failed deliveries)	Customer reviews and finalize the delivery details. System alerts customer and either requires verification or initiates resolution processes
3. Track order status. Problem: Tracking/confirmation problems arise (delays >30min, no updates, or unconfirmed status)	System updates delivery status as the order progresses, sending notifications. System updates order status automatically and notifies relevant parties (customer/admin)
4. Modify delivery details (if required). Problem: Invalid delivery details are entered	Customers can update address within a 2-hour window after placing the order. System highlights invalid fields in red with tooltip: "Australian postcodes must be 4 digits"
5. Confirm order delivery.	The system logs successful deliveries and enables customers to provide feedback.
Variants:	Example Solution
None	

Task 7: Change the displayed products

Task	Details
Purpose	Allow the owner to remove, add and modify products displayed in the store.
Trigger/Precondition	When the owner wants to make changes to the list of displayed products.
Frequency	Anytime the owner wants to make changes to the list of displayed products.
Critical	The owner makes changes while customers are making orders which may cause a problem.

	A sudden big change of products could severely slow the system down (approximately 50+ items being changed at once).
Work Area	Owner Account
Subtasks	Example Solution
1. Remove the displayed products	The system gives the owner the option to remove a product which is being displayed in the store.
2. Modify the displayed products	The system gives the owner the option to modify any existing information of a product which is being displayed in the store.
3. Add new products for displayed	The system gives the owner the option to add a new product to be displayed in the store. The system will require the owner to enter the new product information.
Variants:	Example Solution
None	

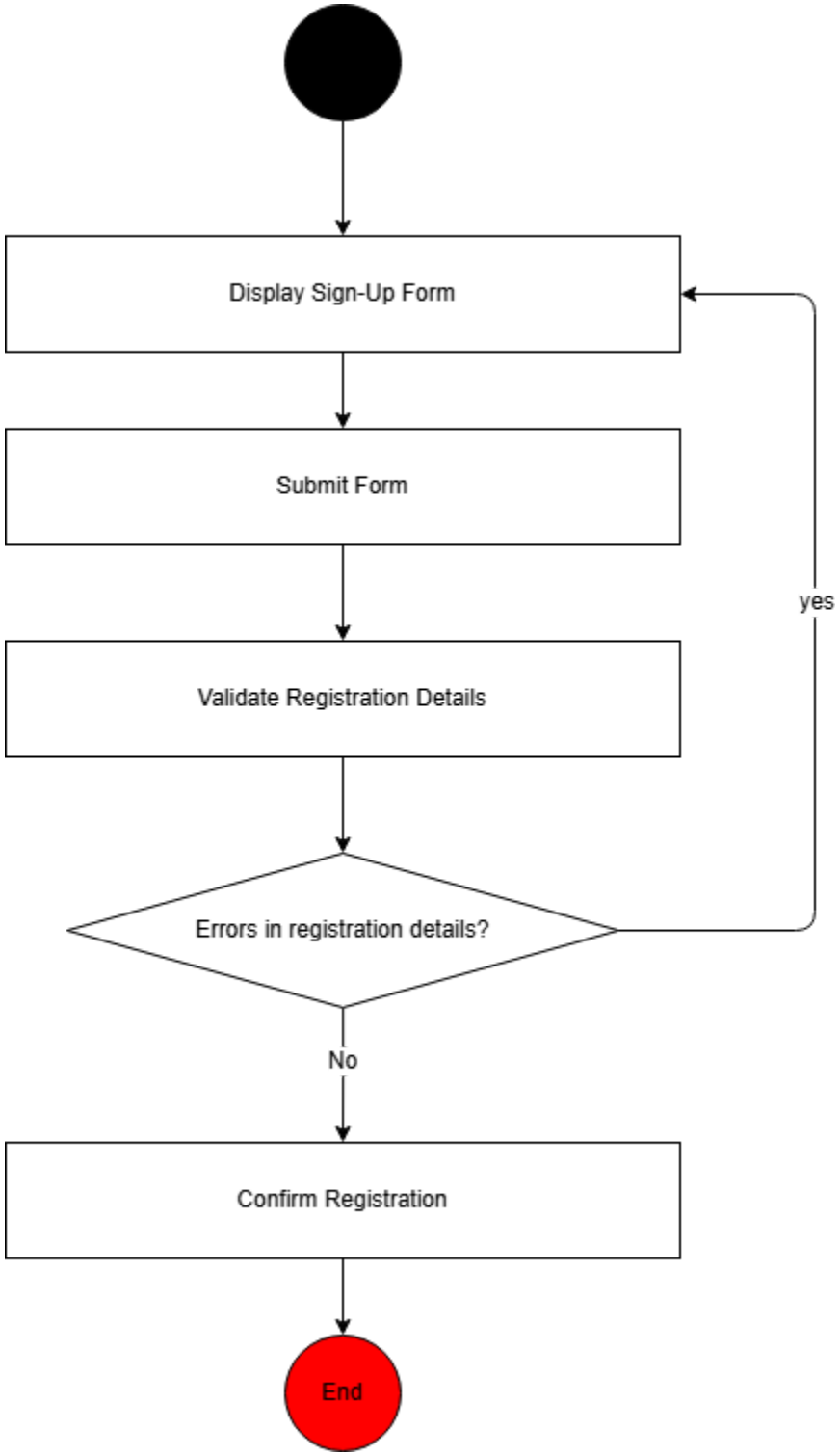
Task 8: Show basic statistics about the goods sold

Task	Details
Purpose	Provide real-time analytics on product sales.
Trigger/Precondition	Admin requests a sales report.
Frequency	Daily, weekly, or on demand (approx. 1–2 times per day).
Critical	Data must be accurate for business decision-making. Constant refreshing and report generating could potentially slow down the system (approx. 20+ report generations consecutively).
Work Area	Admin Dashboard - Reports Section.
Subtasks	Example Solution

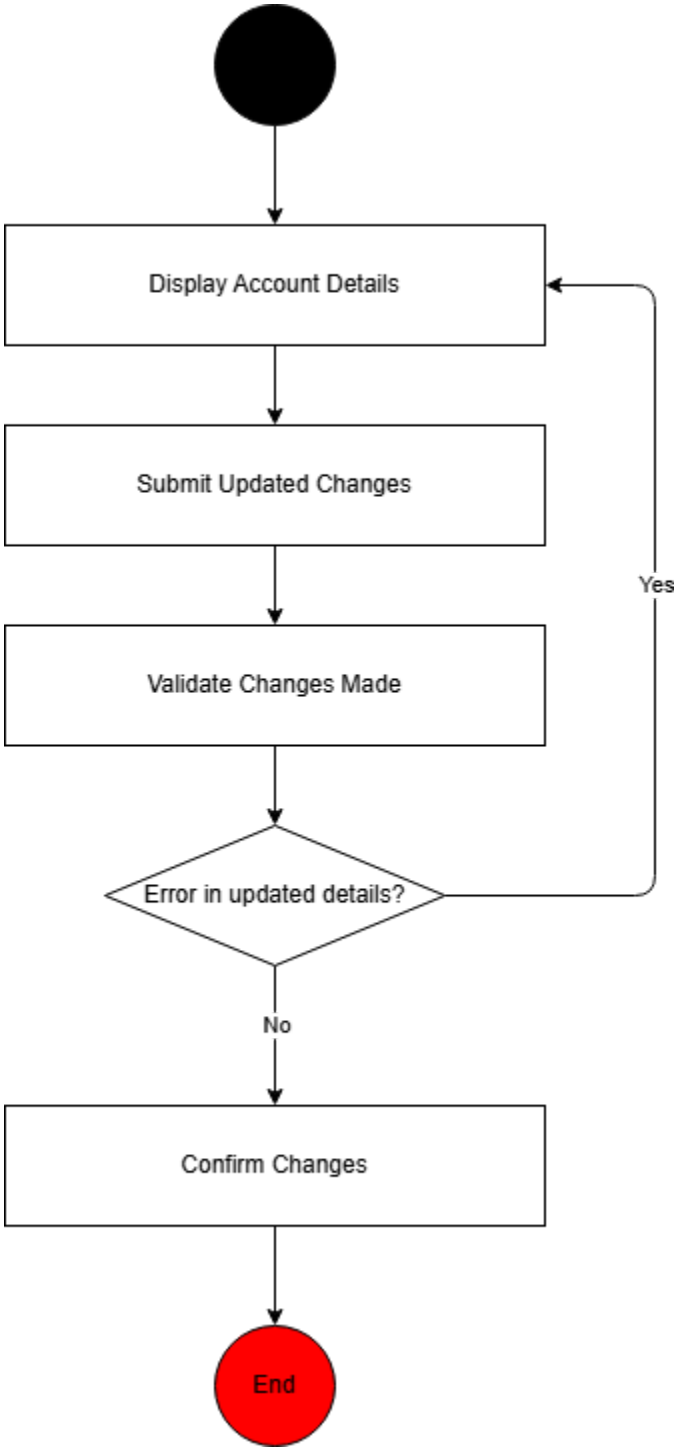
1. Select time period. Problem: Invalid time range	Admin chooses range (e.g., “Last 7 days”). The system will show an error message and prompts the user to input valid dates again.
2. Generate analytics reports. Problem: Fewer than 5 sales are found	Displays visual insights (charts, graphs) on sales trends(e.g., 150 products sold). The system will show “No Sales Data Available” in place of empty charts.
3. Export and share reports. Problem: Exporting fails	Admin downloads reports in PDF/CSV and shares via email or dashboard. The system will give an error message on failing to export the report in the specified format.
4. Apply filters (optional). Problem: Filtered data returns <10 results	The administrator applies filters based on category, region, or type of product. The system will clear the filters and display the message: “No matching records found”.
Variants:	Example Solution
Nonev	

Workflow

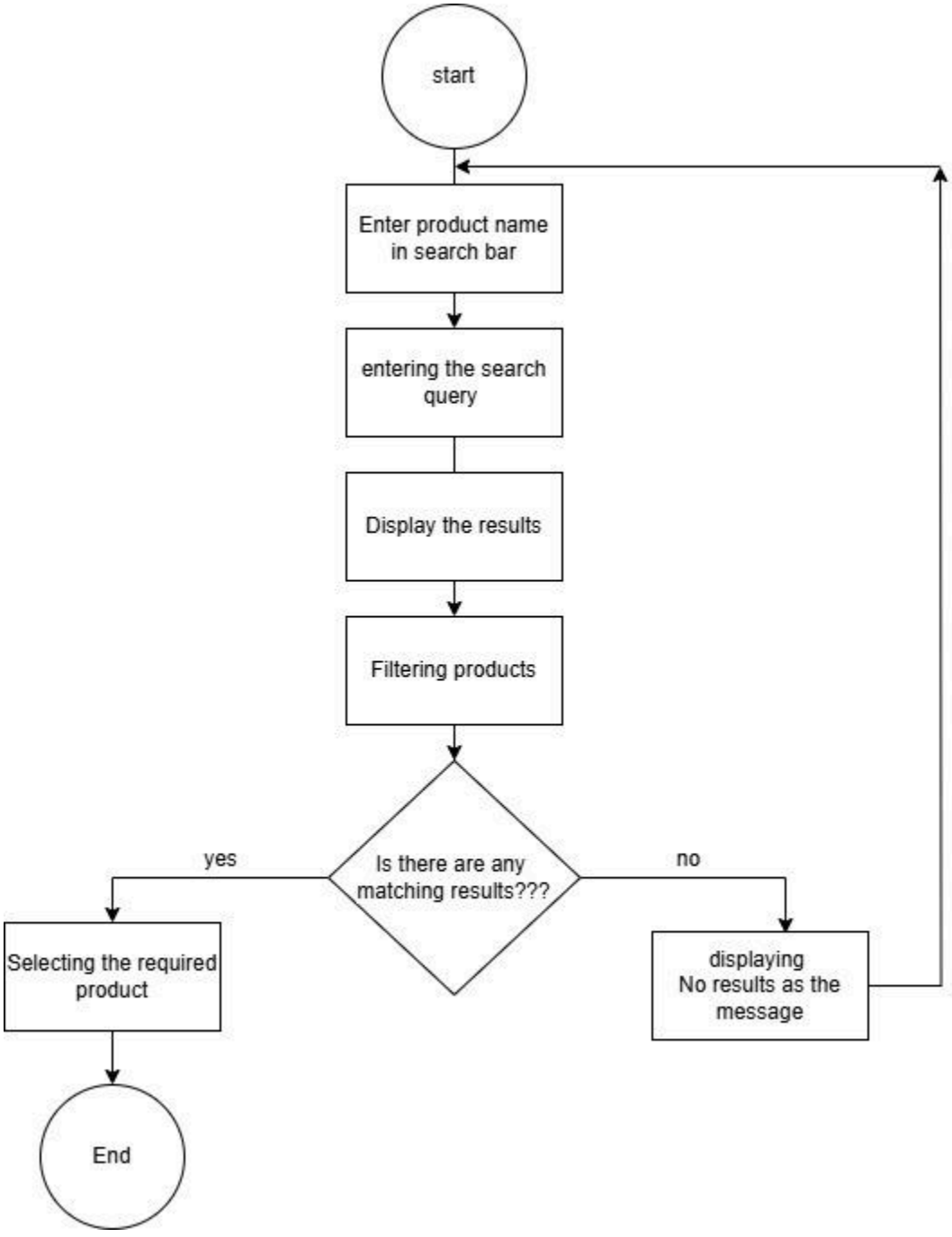
Task 1: Create a customer account



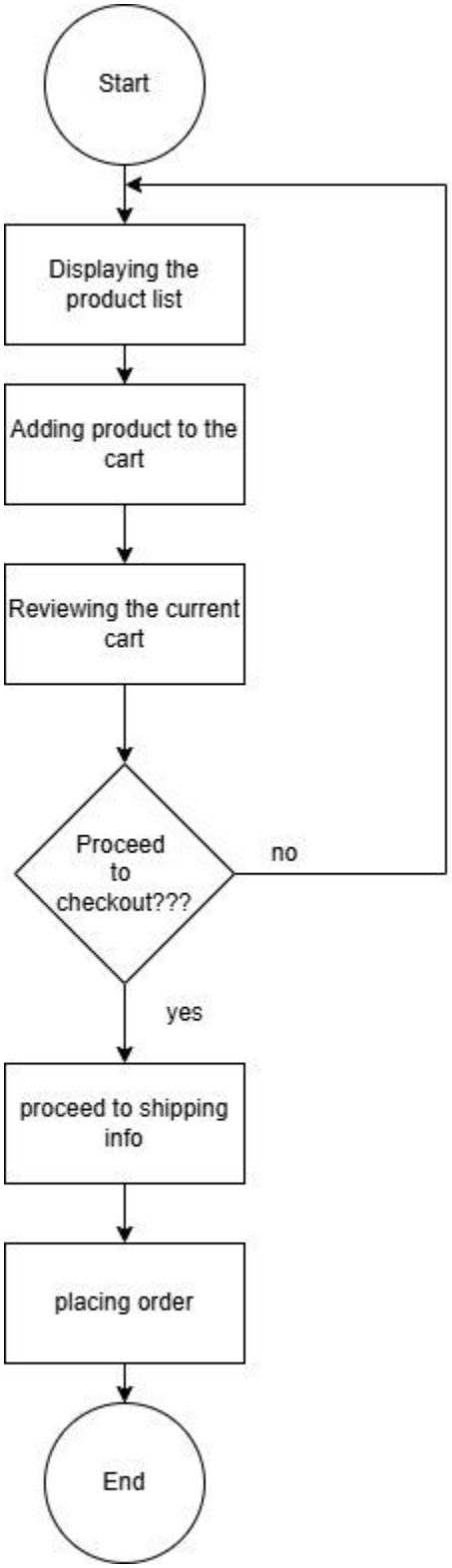
Task 2: Manage customer's information



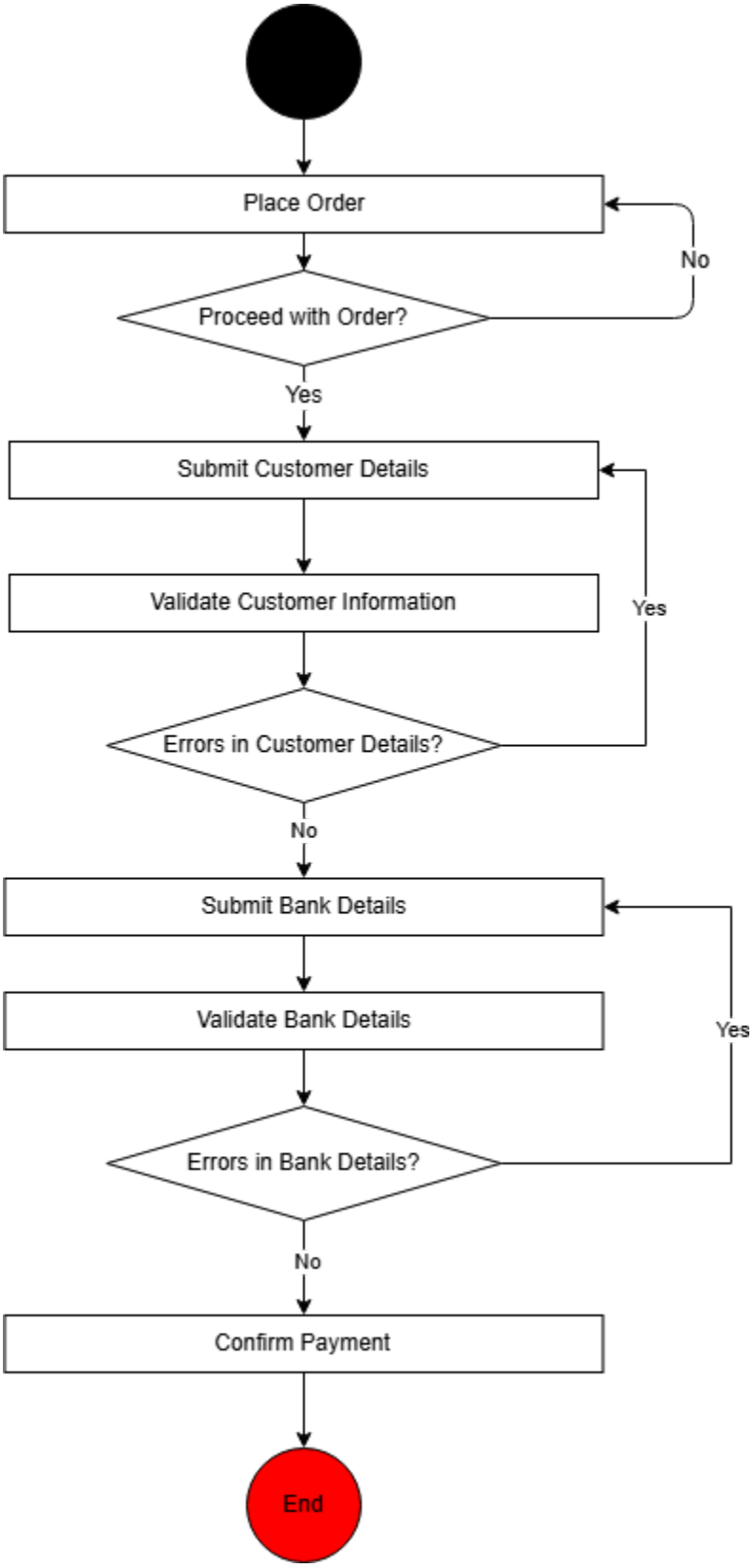
Task 3: Search for the desired product



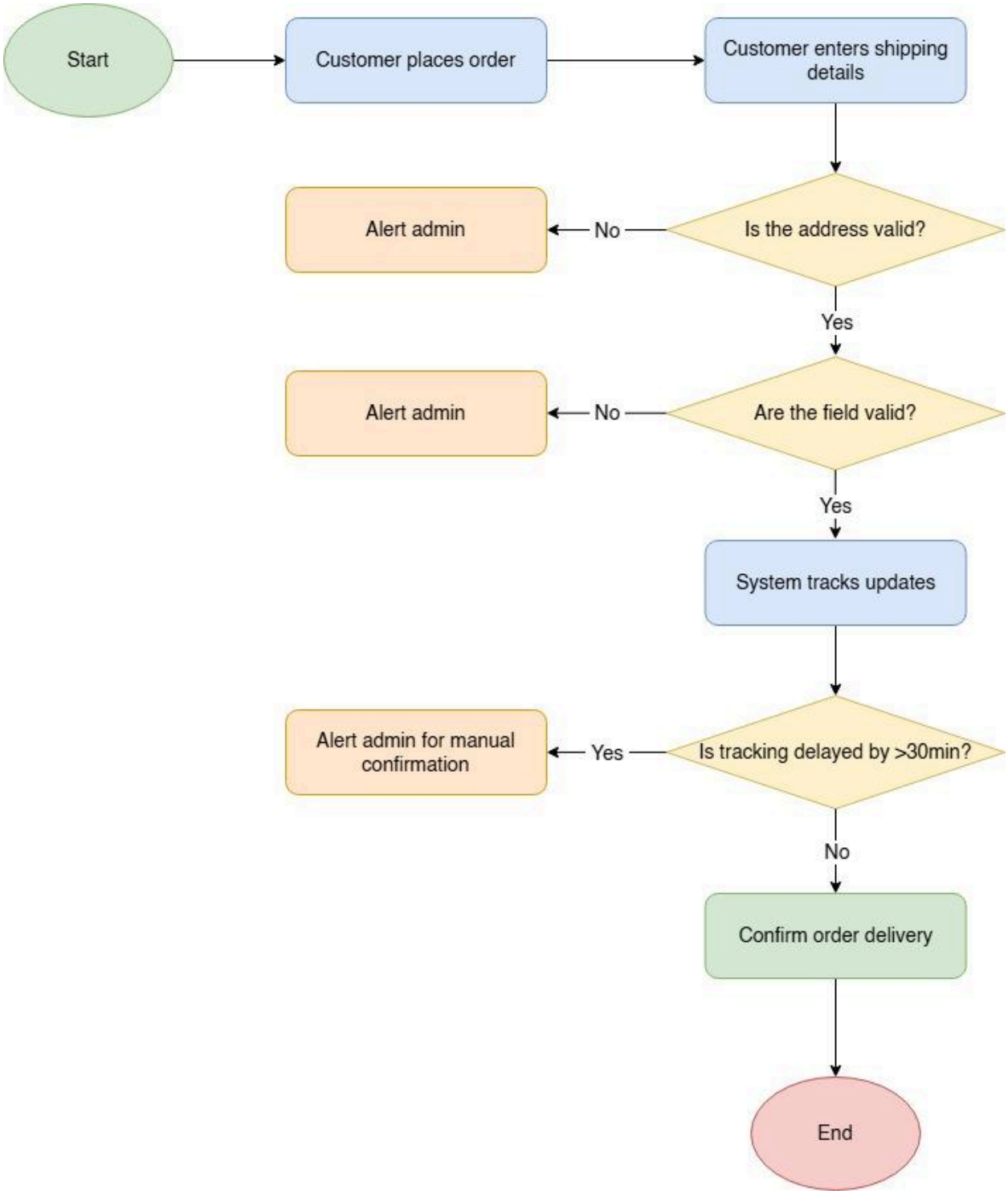
Task 4: Select products and manage the order



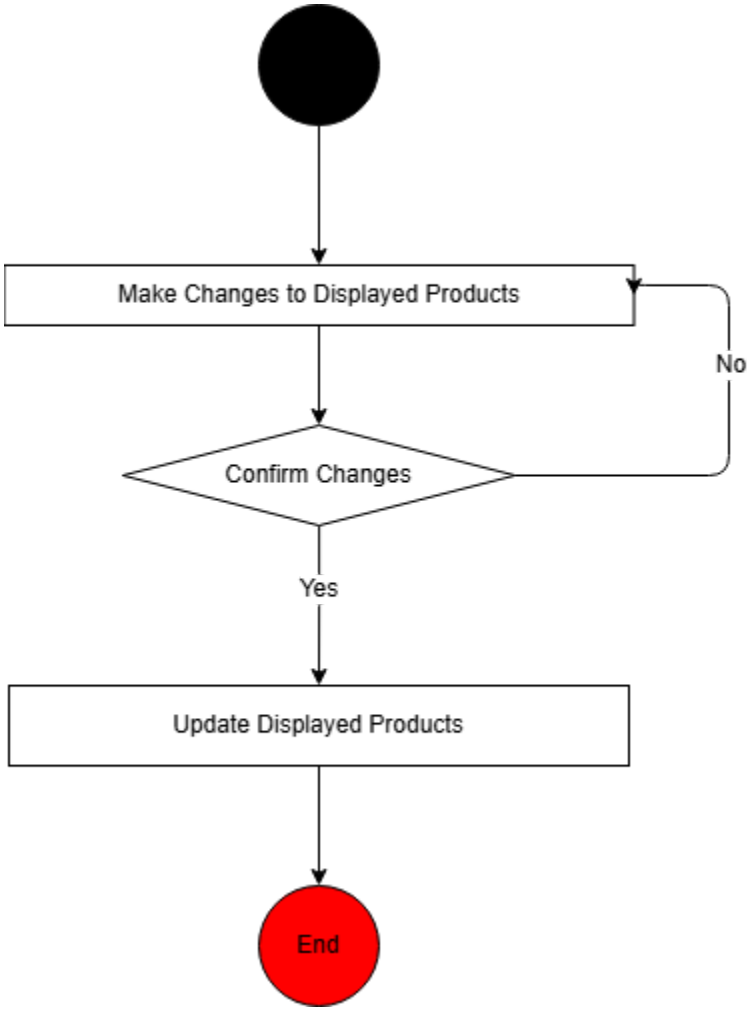
Task 5: Process payment for the order



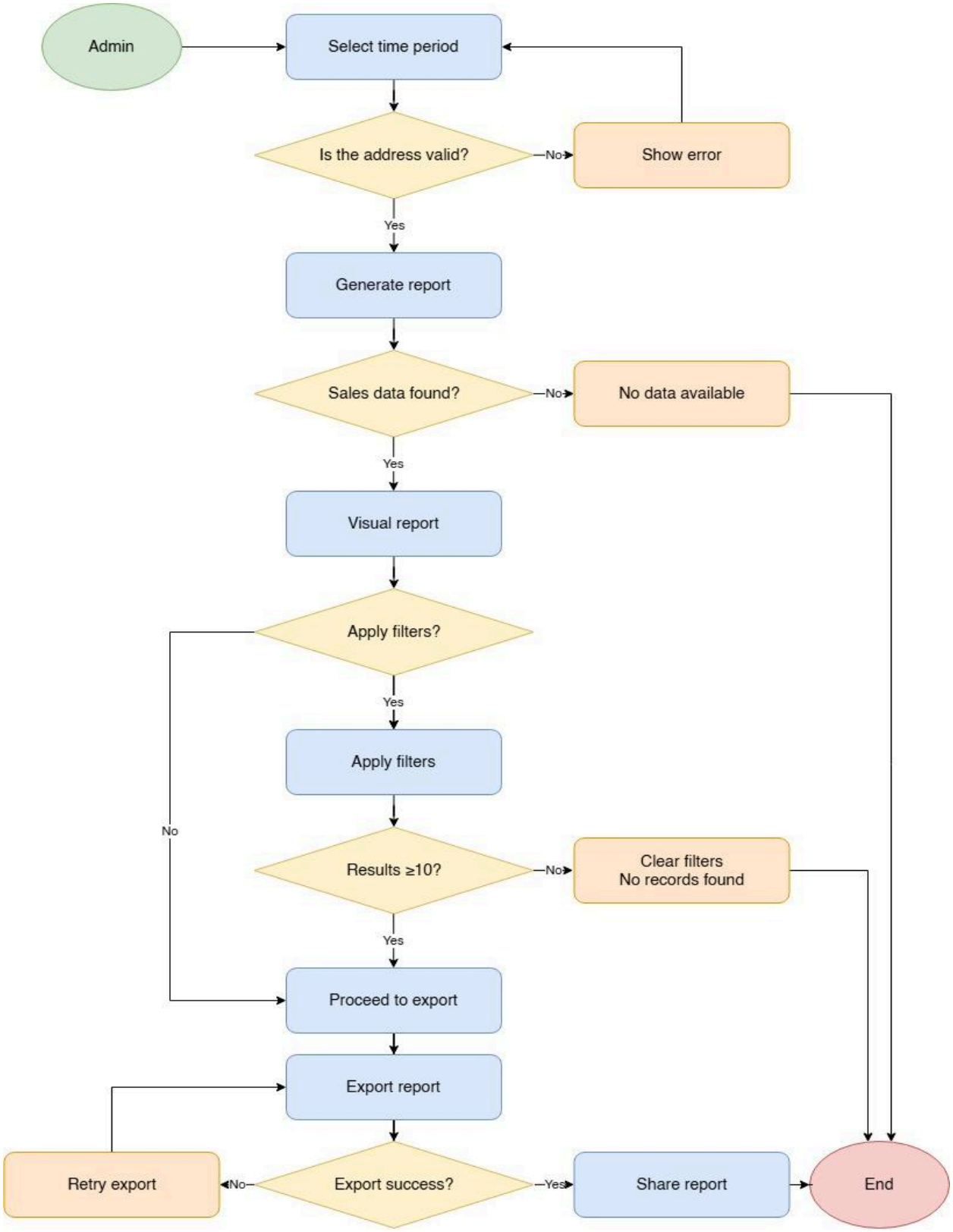
Task 6: Manage the delivery information of the order



Task 7: Change the displayed products



Task 8: Show basic statistics about the goods sold



Quality Attributes of System

Security

Online shopping will inevitably lead to dealing with the customer's personal and financial information, making security imperative as a quality attribute needed to be met by the system. The predicted online shopping scheme will revolve around customers making accounts and purchasing things. In addition to this, the owner's account will also have elevated privileges, effectively meaning that the software must be designed and developed to prevent unauthorized access.

To meet this quality attribute the system must:

- Authorise access to the account when the correct credentials are entered.
- The storing of customer information, transactions, invoices etc, must be encrypted.
- Limit account privileges of the system based on the kind of account that exists.
    - Customer accounts will only be able to view their personal information, transactions, order history etc.
    - Owner account will be able to see a statistical view on the number of goods sold and manage what goods are to be displayed and made available on the online store.

Performance

The efficiency of the Online Electronics Store is a crucial quality attribute, ensuring that customers can browse, search, and place orders without unnecessary delays. Since the platform is expected to handle multiple concurrent users, including browsing customers and an active owner managing products, the system must be designed to maintain fast response times and smooth interactions. A slow or unresponsive platform can lead to customer frustration and potential loss of sales, making performance optimization a priority in the development process.

To meet this quality attribute, the system must:

- Ensure that search and browsing functionalities return results within an acceptable response time.
- Optimize database queries and caching strategies to handle a high volume of customer interactions efficiently.
- Implement load balancing and scalability measures to prevent slowdowns as user traffic increases.
- Ensure that order processing, including payment and invoice generation, completes within a reasonable time frame.

Maintainability

Maintainability is a crucial quality attribute that guarantees the Online Electronics Store system can adapt over time with minimal effort and risk. Given that the system must accommodate features such as product display management, delivery notifications, and analytics reporting, maintainability allows developers to implement modifications efficiently while preserving existing functionalities.

Importance:
In the highly competitive landscape of online retail, regular updates to product details, system logic, or user-facing features are vital. A maintainable system minimizes the costs, time, and errors associated with these updates, thereby promoting business agility and ensuring long-term viability.

To achieve Maintainability, the system should:

- **Use a Modular Architecture**
  Separate concerns such as product management, order processing, delivery handling, and reporting into distinct modules. This allows developers to work on individual parts of the system without affecting others.
- **Enforce Clear Coding and Documentation Standards**
  Consistent naming conventions, inline comments, and comprehensive documentation make it easier for current and future developers to understand, modify, and extend the codebase.
- **Support Automated Testing and Continuous Integration (CI)**
  Implement automated unit, integration, and regression tests across core functionalities to detect issues early. CI pipelines ensure that all updates are verified before being deployed.
- **Utilize Version Control with Branching Strategies**
  Maintain a clean Git-based workflow that enables developers to make, test, and review changes in isolation before merging into the main branch, reducing the likelihood of bugs in production.
- **Enable UI-Based Configuration for Business Users**
  Allow the owner to manage product listings, delivery rules, and generate reports through the admin interface without requiring backend changes. This reduces the dependency on developers for routine updates.

Scalability

Scalability is a critical quality attribute for the Online Electronics Store, ensuring the platform can accommodate increasing numbers of users, products, and transactions without compromising performance or user experience. As the business grows, the system must efficiently handle heightened demands, including spikes in traffic during peak shopping periods, expansion of

product catalogs, and increased concurrent user interactions. A scalable system supports business growth by maintaining responsiveness and reliability, thereby enhancing customer satisfaction and retention.

To achieve scalability, the system should:

- Implement Load Balancing: Distribute incoming network traffic across multiple servers to prevent any single server from becoming a bottleneck, thus enhancing system responsiveness and reliability.
- Adopt a Microservices Architecture: Decompose the application into smaller, independent services that can be developed, deployed, and scaled individually, facilitating efficient resource utilization and system maintenance.
- Utilize Database Sharding: Partition the database into smaller, more manageable pieces (shards) to improve query performance and allow for horizontal scaling as data volume grows.
- Employ Content Delivery Networks (CDNs): Use CDNs to cache and deliver content closer to users, reducing latency and improving load times, especially during high traffic periods.
- Optimize Code and Database Queries: Regularly review and refine code and database queries to ensure they are efficient and capable of handling increased loads without degradation in performance.

By integrating these strategies, the Online Electronics Store can ensure its infrastructure scales effectively to meet growing business demands while maintaining a high-quality user experience.

Other Requirements

The system needs to establish a rigorous framework to ensure that every specification is fully validated before development begins. Every requirement is scrutinized for completeness, consistency, and verifiability, ensuring that it is accurately aligned with stakeholder needs. A comprehensive CRUD check is performed across all domain entities—such as customer accounts, products, orders, payments, delivery details, invoices, and administrative controls—to guarantee that each entity supports the essential Create, Read, Update, and Delete operations. This systematic mapping not only prevents potential redundancies and conflicts in data manipulation but also minimizes the need for costly rework later in the project lifecycle.

In addition to functional validations, the system must achieve stringent quality attributes that underpin superior performance and operational resilience. Robust security measures are integrated, including encryption and strict role-based access controls, to protect sensitive information during transactions and user management. Performance and scalability are ensured through efficient resource management and cloud-based load balancing, allowing the system to dynamically adjust to fluctuating user demands. Furthermore, the architecture is designed with modularity and maintainability in mind, enabling cost-effective future updates and integrations.

Together, these requirements provide a solid foundation that promotes a seamless, secure, and adaptable online retail experience for both customers and administrators.

Validation of Requirements

CRUD Check

Task / Entity	Customer Account	Product	Order	Payment	Delivery Information	Invoice	Owner Account	Statistics
Create a customer account	C							
Manage customer's information	R, U, D							
Search the desired product		R						
Select products and manage the order		R	C, R, U, D					
Process payment for the order				C, R, U, D		C, R		
Manage the delivery information for the order					C, R, U, D	C, R		
Change the displayed products							C, R, U, D	
Show the basic statistics of the goods sold							R	C, U

Possible Solutions

Web Application

This is a traditional approach to an Online Electronics Store System, which will utilise a cloud service called AWS Web services. With performance and scalability being quality attributes that need to be met, AWS Web services provide the means to scale the system effortlessly through the use of load balancing, which would regulate the responsiveness, availability and reliability of the system. AWS cloud services also offers a cost-effective way of supplying the required computing power for the system and only charges the amount used. This cuts heavily into the initial cost, as there is no need to go the traditional route of buying servers to implement this solution.

Customers who visit the AWE Electronics website will be greeted with a homepage that will feature recommended products, along with basic features such as the search bar, browse catalogue, account creation and logging in. The customer will not be requested to make an account until they decide to check-out with their selected product of choice, in which case will prompt them to create an account or login to an existing account to complete the process. Customer account management will also only become available after the customer successfully logs into their account.

The owner of AWE Electronics will have access to administrator privileges which include managing what goods will be displayed and made available on the store catalogue, and also be able to generate a statistical report on the number of goods sold over various time periods (day, week, month, year or date to date) etc. While these reports are relatively basic and without much analytics included when generated, it will provide a general understanding of which products sell well and provide valuable information for business decisions.

Mobile Application

In addition to a web application being a possible solution, it is usually accompanied by a mobile application. Many retailers that have expanded their operations online have a dedicated mobile application to serve as their shopping platform. The concept behind this approach is that by providing the customers with a streamlined purchasing process and a more catered user-friendly experience with browsing the store catalogue.

Customers who choose to use the mobile application instead of the website will be able to browse the store catalogue, search for specific products, and make a purchase once they have decided on their product of choice. All of these will be done through a user-friendly user interface with preference choices catered towards that specific customer, and the purchasing process will be less complicated than to the web application version. For these reasons, many customers might find this approach more preferable over the web application, as it is ultimately simpler and faster due to being a mobile application.

The benefit to an approach like this is dependent on the business decisions the owner wishes to make after the web application solution. The idea behind this is essentially promoting the business further onto the market, potential methods of retaining customers, and the collection of data related to customer buying tendencies. All of which translates to a potential increase in revenue, by making purchases more appealing for the customers.

The main drawback to this solution is the additional cost of developing and maintaining such application. The application has implicit requirements that make performance and usability important attributes, as customers typically choose to use the mobile application version of a store due to its responsiveness and ease of use compared to its counterpart.