Phase 3: Final Specification of Requirements

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1. Introduction

This section outlines the purpose, scope, and overview of the requirements for a t-shirt ordering system.

1.1 Purpose

The purpose of this Software Requirements Specification (SRS) document is to outline the functional and nonfunctional requirements for the development of a comprehensive t-shirt ordering system. This system aims to provide an efficient and user-friendly platform for customers to browse, customize, and purchase t-shirts online, while also offering administrative capabilities for managing orders, inventory, and customer data.

This document serves as a guideline for the development team, detailing the specific features and functionalities expected of the system. It provides a clear understanding of the project scope, objectives, and constraints, ensuring alignment between stakeholders and developers throughout the development lifecycle.

1.2 Scope

The software system to be developed is named “Custom Tee Design and Order System”. The system will have several software products:

- Design Interface: An interactive tool to allow users to create custom t-shirt designs.
- Order Management System: A backend system to handle orders and inventory.
- Customer Interface: A user interface to allow customers to view their order history, track orders, and manage their account. Offers pages for browsing and ordering premade T-Shirt designs. A search bar stays at the top of the page allowing users to search for specific shirts. Filtering options allow users to filter/order shirts by size, price, color, etc.

The system shall:

- Enhance the customer experience by offering a user-friendly and accessible interface for custom t-shirt designs.
- Streamline order processing by integrating a guided ordering system which helps prevent user errors.
- Increase scalability of the business: The system will be built to handle enough 10,000 concurrent users making orders and leaves room for the business to grow.

Objectives and Goals:

- To provide a satisfactory user experience for custom t-shirt design.
- To reduce turnaround time from design to delivery.
- To ensure high customer retention through processes like efficient order tracking, quality product output, and intuitive customer service.
- To provide adequate facilities for the business owner to understand and manage their business

1.3 Definitions, Acronyms, and Abbreviations

Not Applicable

1.4 References

No References

1.5 Overview

This document contains all of the functional and nonfunctional requirements of the system as well as specifications of the relationships between different variables and states across the product.

The document is organized by first describing the core functionalities and constraints of the system. It is then followed by specific requirements such as dependencies, constraints, and interface requirements. Also contained are two diagrams: A UML Statechart and a UML Activity Diagram. These describe transitions between different states and activities within the system.

Finally the document closes with specific functional requirements for each user class and how they should be implemented. Additionally, extra requirements not stated before are mentioned.

2. Overall Description

This section of the SRS describes the general factors that affect the t-shirt site, its backend system, and its requirements. This section does not state specific requirements. Instead, it provides a background for those requirements, detailed in the subsections below. They include product perspective, product functions, user characteristics, constraints, assumptions and dependencies, and apportioning of requirements.

2.1 Product Perspective

The product is an e-commerce site with a backend system to manage orders and its inventory of raw materials. It is not related to any existing products: it is self-contained. It is similar to products like Etsy sites through which clothing is sold, however, this site is purely focused on the sale of t-shirts with the option of ordering custom designs.

The subsections below will describe how the site and backend system will operate in various constraints, including system interfaces, memory, operations, and site adaptation requirements. (*Note: User, Hardware, Software, and Communications Interfaces are outlined in Section 3)*

2.1.1 System Interfaces

The front-end website is going to include a variety of necessary functionalities. It is through the site that customers can create an account, save payment/shipping information for future use, submit requests for a quote on custom designs, submit feedback, order shirts, submit a form for returns, search the website for specific clothing items, manage items added to their carts, contact customer support, and more.

The back-end system is going to include a variety of necessary functions for employees. Through this system, one will be able to view orders, change their status (as the order is processed/shipped), create orders in the case that a custom shirt is requested, generate order reports, view inventory of materials, alter inventory of materials as more are delivered, and more.

The database will contain a history of all customer orders, including account, name, address, items ordered, date of order, and order status. The database will also contain all users' account information, including email, name, payment information, and shipping information.

2.1.6 Memory

The software requires enough memory to store the information required for each order's warehouse and shipping information. We do not estimate that there will be significant memory constraints for the web portal application

2.1.7 Operations

There are many different kinds of user-initiated operations. These include placing orders, account creation, submitting forms for returns, submitting requests for a quote on an uploaded custom design, editing account details, managing items added to their cart, and contacting customer support.

There will also be unattended operations, including when account information gets automatically uploaded to the database on creation, orders are placed, feedback is submitted, order reports are generated each day.

Lastly, there will be backup and recovery operations – there will be a backup of the database created once a week to ensure that data cannot be lost. These backups can be initiated manually at any point by an administrator.

2.1.8 Site Adaptation Requirements

Not applicable.

2.2 Product Functions

The main functions and capabilities of the system will include:

Ordering Products

- Users shall be able to buy pre-made T-shirts as shown on the website
- Users shall be able to upload their own designs for T-shirts and then order shirts with that custom design

Account Creation and Management

- Users shall be able to create their own accounts with an email and password in order to track orders both past and present.
- Users must have the ability to change their registration email or delete their account entirely.
- Email and Password data shall be encrypted so as to prevent data leaks or breaches.

3rd Party Payment Integration

- Users shall be able to pay for ordered T-shirts via Paypal, Stripe, and Square

Custom Designs

- Users shall have the ability to submit custom designs for t-shirts so that they can have a personalized experience.
- Custom designs shall be uploaded via an in-browser form.
- Custom designs shall be uploaded in the png or jpeg formats and have a maximum size of 4096x4096.

Returns

- After receiving their order, a user may return their order by requesting a return shipping label and returning their product.
- After confirmation of receiving a return, the customer will be refunded the money that they spent previously at the store.

Feedback

- After completing an order, a user may leave feedback by giving a star rating from 1-5 along with a short message, under 3k characters.

2.3 User Characteristics

The t-shirt ordering system shall cater to a diverse range of users with varying levels of technical proficiency and objectives. The primary user roles and their characteristics are outlined below:

Customers:

- **Technical Proficiency**: Customers may possess varying levels of technical expertise, ranging from novice to experienced internet users. The system should accommodate users with basic browsing skills and provide clear instructions for navigating the ordering process.
- **Objectives**: Customers use the system to browse, customize, and purchase t-shirts according to their preferences. They seek a seamless and enjoyable shopping experience, with intuitive navigation, personalized customization options, and secure payment processing.
- **Devices**: Customers access the system from a variety of devices, including desktop computers, laptops, smartphones, and tablets. The system should be responsive and optimized for different screen sizes and resolutions to ensure consistent usability across devices.

Administrators:

- **Technical Proficiency**: Administrators typically have a higher level of technical proficiency compared to customers. They are responsible for managing system operations, including order processing, inventory management, and user administration. The system interface should offer advanced functionalities tailored to their administrative tasks.
- **Objectives**: Administrators use the system to oversee and streamline the ordering process, manage inventory levels, track order fulfillment, and generate reports for business analysis. They require efficient tools and comprehensive data visibility to effectively perform their duties.
- **Access Levels**: Administrators may have different access levels and permissions within the system, depending on their roles and responsibilities. The system should support role-based access control to restrict unauthorized actions and ensure data security.

Guest Users:

- **Limited Engagement**: Guest users are individuals who visit the system without creating an account or logging in. They have access to basic features such as browsing products and viewing product details but are restricted from accessing personalized features such as order history and saved preferences.
- **Objectives**: Guest users typically explore the system to browse available t-shirt options, gather information, and make purchase decisions. While their engagement with the system is temporary, providing a seamless and informative browsing experience can encourage conversion to registered customers.

2.4 Constraints

- The system must have a front-end website and a backend application.
- The system must be GDPR compliant even when not accessed from the EU.
- The website must be compatible with smartphones, tablets, and desktop computers.
- The system must integrate with 3rd party payment processing.
- The system must integrate with external shipping providers
- The website must comply with all US and EU regulations on user activity tracking
- The backend and front-end must be developed in high level, memory safe, languages
- The backend and front-end must communicate via encrypted channels to prevent man in the middle attacks

2.5 Assumptions and Dependencies

Assumptions

- Operating System Compatibility: The system assumes that users will access the platform using modern operating systems that support the latest web browsers. If users attempt to access the system using outdated or unsupported operating systems, they may experience reduced functionality.

- Internet Connectivity: It is assumed that users will have stable internet access when using the system. The system's performance and usability are reliant on this access as disruptions could affect the system functionality.

- Third-Party Services Availability: The system's operation depends on external services. It is assumed these services will be reliably available.

Dependencies

- Payment Processors: The system's ability to process payments efficiently depends on integration with third-party payment services. Changes in their service disruptions could impact the system's payment functionalities.

- Web Development Frameworks: The system is developed on web development frameworks. Any significant updates for these frameworks could impact the system's maintenance and scalability.

- Hardware Performance: While not directly involved in the system’s operation, the performance of user hardware can affect the system's usability. Slower hardware may result in worse system performance for some users.

2.6 Apportioning of Requirements

We do not anticipate any requirements that must be delayed until a future version of the software

3. Specific Requirements

This section contains all of the software requirements to a level of detail sufficient to enable designers to design a system to satisfy those requirements, and testers to test that the system satisfies those requirements. Each stated requirement will be externally perceivable by users, operators, or other external systems. They include at a minimum a description of every input (stimulus) into the system, every output (response) from the system, and all functions performed by the system in response to an input or in support of an output.

3.1 External Interface Requirements

This section contains a detailed description of all inputs into and outputs from the software system. It complements the interface descriptions in section 5.2 and does not repeat the information there.

3.1.1 User Interfaces

3.1.1.1 Frontend Interfaces

Purpose: To provide users with a user-friendly interface to interact with the e-commerce platform, facilitating browsing, purchasing, and account management activities. Users shall also be able to add information to or edit their profiles to save information and make purchases more seamless.

Source of Input/Destination of Output: User input shall be collected through clicks and typed text. Output shall be displayed as web pages with relevant information, images, and links. Additionally, relevant information shall be sent to the backend database, including orders and account information.

Valid range, accuracy, and/or tolerance: User inputs should adhere to specified formats and constraints (e.g., valid email format for login).

Units of measure: Milliseconds (ms), measuring response time.

Timing: Responses shall be instantaneous or within acceptable response times.

Relationships to Other Inputs/Outputs: Interconnected pages facilitate navigation and interaction flow. For example, the homepage links to product pages, login/logout pages, and the shopping cart. Account information inputted on the profile shall be easily importable in checkout sequences. Order information shall be sent to the back-end for order report generation.

Screen formats/organization: Each page shall have a clear layout, with intuitive organization of elements such as sales listings, login/logout options, product details, and shopping cart contents. It shall be responsive to varying screen resolutions. In addition, each page should be organized and layed out in such a manner that it is easily understood by the screen reader built into Windows and macOS

Window formats/organization: Browser windows shall display pages consistently across varying browser sizes, ensuring responsiveness and usability.

Data Formats: Data should be presented in a readable and understandable format, including text, images, and structured data such as pricing information and order statuses. Data to be sent to the back-end shall be formatted compatibly.

Command Formats: User actions (e.g., clicking on links, adding items to cart) should trigger appropriate back-end commands for data processing, updating, and data storage.

End Messages: There shall be confirmation messages for successful actions (e.g., item added to cart, order placed) and error messages for unsuccessful actions (e.g., invalid login credentials, out-of-stock item). Administrators shall be able to see additional confirmation/error messages in the console to assess functionality more in-depth (site/back-end communication confirms or failures, for example)

3.1.1.2 Backend Interfaces

Purpose: To manage orders, reports, and return requests efficiently and accurately, facilitating backend operations and providing necessary functionalities for order processing and data storage/management. In addition, it must show live inventory, sales, database performance, website performance, and uptime so that the status of all systems can be determined at a glance.

Source of Input/Destination of Output: Data input shall be through information collected from users on the website, backend processes, and administrative actions. Output shall be provided as downloadable files and indicators on the website (lack of inventory).

Valid range, accuracy, and/or tolerance: Backend processes shall handle data accurately, ensuring correct order processing, report generation, return request management, inventory management, and user feedback collection/visibility.

Units of measure: Milliseconds (ms), for response time

Timing: Real-time interaction for order processing; Reports and return request handling may have longer processing times depending on the complexity and volume of data and employee availability.

Relationships to Other Inputs/Outputs: Interconnected backend functions ensure seamless data flow and processing. For example, the order page may link to the report page for generating order reports.

Screen formats/organization: Backend interfaces shall have a clear layout, with organized sections for order management, report generation, return request handling, viewing user feedback, and inventory management.

Window formats/organization: Backend interfaces shall be designed for administrative use, with functionality prioritized over aesthetics. The window shall be formatted to maximize the efficiency of screen space for administrators with technical expertise/training.

Data Formats: Data should be presented in structured formats suitable for backend processing, including database entries, CSV files for reports, and JSON/XML for API interactions.

Command Formats: Administrative actions should be executed through backend commands or API calls, triggering appropriate processes for order management, report generation, and return request handling.

End Messages: Confirmation messages for successful backend actions (e.g., order processed, report generated) and error messages for failed actions (e.g., data validation errors, processing failures).

3.1.2 Hardware Interfaces

For one, the software shall be connected to and supported by a dedicated web server. This web server must have sufficient memory to store account information, order history, and inventory information, and relevant website assets (like pictures of t-shirts). It must be supported by a processor with multiple cores to support optimal database operations. It must have fast network connectivity to ensure that users have a seamless experience traversing the website and using the backend software.

The software must also interface with a printer to ensure that generated order reports can be printed automatically.

The software must use a relational database management system to store and manage accounts, orders, and inventory information. This database must be supported by a multi-core processor, sufficient data storage, and strong network connectivity.

3.1.3 Software Interfaces

Relational Database Management System
Name: MySQL
Version Number: 8.0.3
Source: https://dev.mysql.com/downloads/mysql/
Purpose: This is used as the database software to hold all of the information required for the website to function properly.

Operating System
Name: Ubuntu
Version Number: 24.04
Source: https://ubuntu.com
Purpose: This is used to host the front-end web server as well as the backend database and interface.

3.1.4 Communications Interfaces

All external communication between pieces of the software will occur via SSL/TLS encrypted HTTPS channels. This includes both website-to-database queries and backend-to-database queries.

3.2 Functional Requirements

Functional requirements define the fundamental actions that must take place in the software in accepting and processing the inputs and in processing and generating the outputs. They will be partitioned into sub functions or subprocesses as appropriate, although this does not imply that the software design will also be partitioned that way.

3.2.1 Account-holding customer

Each customer that uses the website will have a limited set of actions that they can do. Fundamentally they can browse the website, place orders, view in-progress orders, and then provide feedback on already placed orders. Structuring the website in this manner and constraining what the user can do significantly simplifies the design. As a logical consequence, the user can only perform the actions we want them to perform. If they go outside this boundary and cause an error state, the application should handle the error and provide the user with clear and informative error messages.

List of Functional Requirements:

1. On any page of the website, there shall be a profile button that drops down with 3 clickable options: “Profile Settings”, “Orders”, and “Logout”.
2. When clicking the “Profile Settings” options, the user shall be taken to a different page.
3. **Profile Settings Page Requirements:**
    a. The profile settings page shall include text indicating what email is associated with the account
    b. The profile settings page shall display the phone number of the dedicated helpline
    c. Below the helpline phone number, the profile settings page shall display information about the helpline’s active hours.
    d. The profile settings page shall include a button labeled “Save Payment Information”.
        i. After clicking the “Save Payment Information” button, the user shall be taken to the enter payment information screen.
            1. The enter payment information screen shall include a set of fields for credit card information including credit card number, expiration date, name on card, address, optional address line 2, and security code.
                a. The credit card number field shall require 15 or 16 numbers to be accepted.

b. The expiration date field shall prompt the user to enter a date in the future to be accepted.
c. The name on credit card field requires a string with a maximum of 200 characters.
d. The address field requires a string with a maximum of 500 characters.
e. The security code field requires 3 numbers.

2. Under the fields on the payment information screen will be a button labeled “save payment information”.
3. After the save payment information button is clicked, if all fields are valid, the site shall save the information to the user’s account data in the database.
4. After the save payment information button is clicked, if any field is not valid, the page shall display red text detailing which fields need to be fixed.

e. The profile settings page shall include a button labeled “Reset Password”
   i. When the “Reset Password” button is clicked, it shall prompt the user to confirm whether they want a link to reset the password with two buttons labeled “Yes” and “No”.
      1. If the user clicks “Yes” a link to reset the password shall be sent to the user’s email address.
         a. Password Reset Screen requirements in 3.2.3 functional requirements list
      2. If the user clicks “No”, they shall be taken back to the “Profile Settings” page.

f. The profile settings page shall include a “delete account” button.
   i. If the “delete account” button is clicked, the user shall be taken to the account deletion page.
      1. The account deletion page shall include bolded text highlighted in red indicating that account deletion is not reversible.
      2. The account deletion page shall include two buttons, a red “DELETE ACCOUNT” button and a blue “Return to Profile Settings” button.
         a. If the user clicks the red “DELETE ACCOUNT” button, they will be logged out of their account.
         b. If the user clicks the red “DELETE ACCOUNT” button, their account information will be deleted from the database.
         c. If the user clicks the red “DELETE ACCOUNT” button, the email associated with the account shall receive a final goodbye email with information about the site and a prompt to leave feedback at the feedback page.
         d. If the user clicks the blue “Return to Profile Settings” button, they shall be taken back to the Profile Settings page.

4. <u>Orders Page Requirements:</u>

a. The orders page shall display a list of all orders associated with a user’s account.

b. Each order displayed on the main orders page shall include the date the order was place, the order ID, a list of the items ordered, the final cost of the order, and the order status (received, processed, shipped, or delivered).
    i. Orders shall be displayed in chronological order with the most recent orders appearing first
    ii. If the order status is either received or processed, a hyperlink shall be displayed below as "Cancel Order" which will redirect users to the order cancellation form.
    iii. Example order:

4-1-2024	18730280000123	- (M) Easter Rabbit White Tee - (S) Child Rabbit Black Tee	$27.45	**Received** Cancel Order

c. The page shall display a maximum of 25 orders at one time.
    i. Users shall be able to navigate to additional pages if they have more than 25 orders associated with their account.

5. If the user clicks the "Logout" button, the user shall first be shown a confirmation window, then if they click the logout button a second time; be redirected to the landing page.

3.2.1.1 Customers must be able to create an account and log in to the website

a) Validity Checks

The customer must be able to create an account via email and password as well as log in to their account after the fact.

b) Exact Sequence of Operations

1. The user selects "Create an Account/Log in"
2. If the user is creating a new account, they shall input an email and a password that will be entered twice to confirm
    a. If the email is already associated with an account, an error message will display stating that the user must use a different email address
    b. If the user's passwords do not match, an error message will be displayed stating as such
3. If the user is logging in, they shall input their email and password
    a. If the user's email address or password is inputted incorrectly, an error message will be displayed stating that they must try again
4. The user is transported to the home page

c) Responses to abnormal Situations

a) Overflow

A user will not be able to place enough orders required to overflow any counters

b) Communications Failures

In the event of a communications failure with the main server, the user should be directed to an error page

c) Error handling and Recovery

The website should continue to go to the error page, and in an effort to prevent DDOS-like attacks, should wait 30 seconds in between retrying to connect.

d) Effect of parameters

As a user is not able to directly interact with the system, they are unable to directly affect the parameters of the system

e) Relationship of inputs and outputs

a) Input / Output Sequences

For any input sequence of actions, if those actions are repeated the same results must be obtained.

b) Formulas for input-to-output conversion

N / A

3.2.1.2 Customers must be able to browse the website, view items, and place orders

a) Validity Checks

The customer must be constrained by the website so they are unable to, without breaking the system, perform any operations that would otherwise cause the system to fail

b) Exact Sequence of Operations

1. The user logs into the website
2. The user browses around the website, viewing items, and adding the desired ones to the cart
3. The user may continue to do so until they have selected all of the items that they desire
4. The user goes to their cart
5. The user checks out by entering their payment information and shipping address
6. The user receives an email receipt as proof of purchase
7. The user then receives their T-shirts by mail

c) Responses to abnormal Situations

a) Overflow

A user will not be able to place enough orders required to overflow any counters

b) Communications Failures

In the event of a communications failure with the main server, the user should be directed to an error page

c) Error handling and Recovery

The website should continue to go to the error page, and in an effort to prevent DDOS-like attacks, should wait 30 seconds in between retrying to connect.

d) Effect of parameters

As a user is not able to directly interact with the system, they are unable to directly affect the parameters of the system

e) Relationship of inputs and outputs

a) Input / Output Sequences

For any input sequence of actions, if those actions are repeated the same results must be obtained.

b) Formulas for input-to-output conversion

N / A

3.2.1.3 Customers must be able to view previous and current orders

The customer must be given the ability to review previous transactions as well as current orders.

a) Validity Checks

The system shall authenticate user credentials before allowing access to order history and details.
The system shall validate input parameters such as user IDs, order IDs, and date ranges to ensure they are within acceptable formats and ranges.
The system shall verify the existence of the specified orders associated with the user before proceeding with order retrieval and display operations.
The system shall ensure that only orders with appropriate status (e.g., completed, shipped) are displayed to the user.
The system shall confirm that users can only view their own orders and not orders associated with other users.
The system shall check the timestamp of orders to ensure that users are viewing orders within the correct time frame (e.g., current orders or previous orders).
The system shall validate the consistency of order data displayed with the information stored in the database, ensuring accuracy and integrity.
The system shall implement proper error handling mechanisms to address any exceptions encountered during the retrieval and display of order data, providing clear feedback to users.

b) Exact Sequence of Operations

1. The user logs into the website
2. The user selects “view orders”
3. The user is presented with a complete order history along with statuses attached to each of them

c) Responses to abnormal Situations

a) Overflow

In the event of overflow the website should crash and display an error page

b) Communications Failures

In the event of a communications failure with the main server, the user should be directed to an error page

c) Error handling and Recovery

The website should continue to go to the error page, and in an effort to prevent DDOS-like attacks, should wait 30 seconds in between retrying to connect.

d) Effect of parameters

As a user is not able to directly interact with the system, they are unable to directly affect the parameters of the system

e) Relationship of inputs and outputs

a) Input / Output Sequences

For any input sequence of actions, if those actions are repeated the same results must be obtained.

b) Formulas for input-to-output conversion

N / A

3.2.1.4 Customers, after receiving their order, shall have the option to provide feedback, and return their order if requested.

a) Validity checks on the inputs

The system must ensure that the order number provided by the customer is their own.
The system must ensure that a user may only provide feedback after receiving their order
The system must ensure that a user may only request a return after feedback has been received

b) Exact sequence of operations

The user receives their product
If desired, the user leaves feedback.
If desired, the user may request a return.

c) Responses to abnormal situations

1) Overflow

In the event of overflow the website should crash and display an error page

2) Communication facilities

In the event of a communications failure, the website should go to an error page if possible, otherwise crash the webpage

3) Error handling and recovery

In the event of any unexpected error, crash the website and send a stacktrace to the main server for debugging purposes.

d) Effect of parameters

As a user is not able to directly interact with the system, they are unable to directly affect the parameters of the system

e) Relationship of inputs and outputs

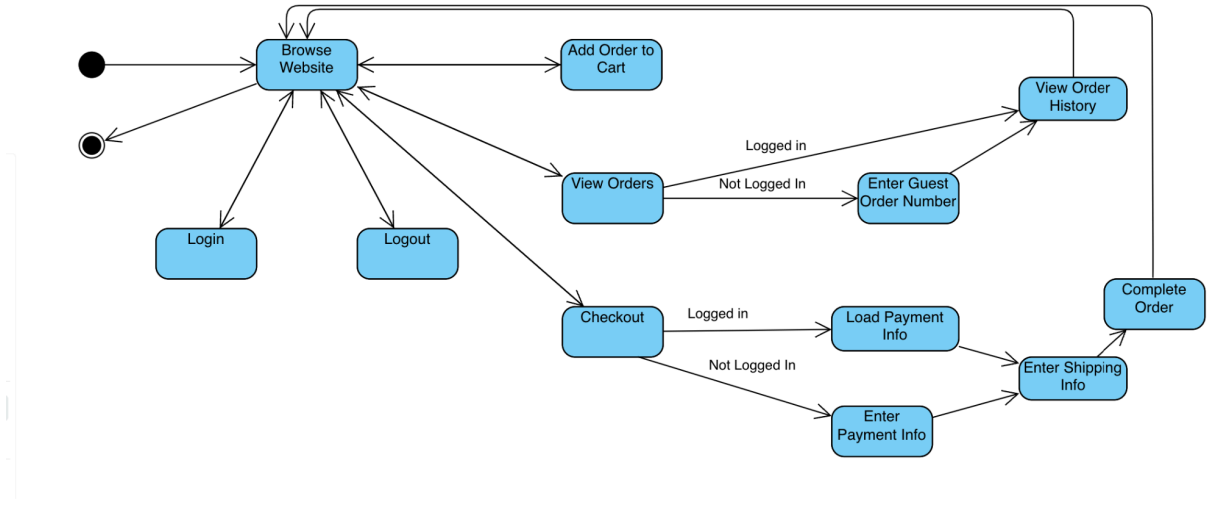
a) Input / Output Sequences

For any input sequence of actions, if those actions are repeated the same results must be obtained.

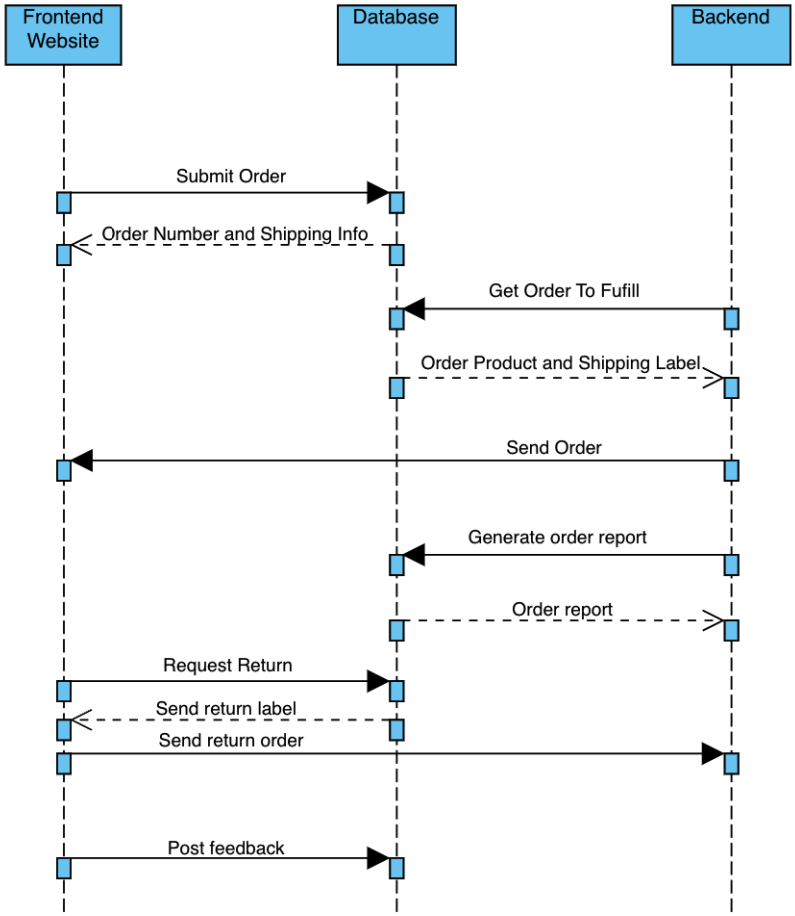
b) Formulas for input-to-output conversion

N / A

3.2.1.4 Activity Diagram



3.2.1.5 UML Activity Diagram



3.2.2 Administrators

Administrators are responsible for the management, upkeep, and analysis of the system. As such they shall be given access to many different tools and permissions to complete such tasks.

List of Functional Requirements:

1. On any page of the website, there shall be a profile button that drops down with 3 clickable options: “Profile Settings”, “Customer View”, and “Logout”.
2. On the taskbar at the top of the page, administrators will have 3 clickable buttons labeled “Store Management”, “Raw Materials”, and “Customer and Order Info”
3. On any product page, administrators shall be able to click an edit button to change the content of the page and submit alterations.
4. Administrators shall have access to return requests and be able to handle them through either accepting or rejecting the request.
5. Administrators shall have access to feedback and reviews for business purposes.

3.2.2.1 Administrators shall have the ability to retrieve and review order and customer data.

The system shall allow administrators to retrieve and review order and customer data through a series of steps involving validity checks, sequential operations, handling of abnormal situations, consideration of parameters, and establishment of relationships between inputs and outputs.

a) Validity Checks on Inputs:

The system shall validate administrator credentials before allowing access to order and customer data retrieval.
The system shall validate input parameters such as order IDs, customer IDs, and date ranges to ensure they are within acceptable formats and ranges.
The system shall verify the existence of the specified order and customer data before proceeding with retrieval and review operations.

b) Exact Sequence of Operations:

1. Administrator logs into the system using valid credentials.
2. Administrator navigates to the order and customer data retrieval section.
3. Administrator inputs parameters such as order IDs, customer IDs, and date ranges.
4. System performs validity checks on the inputs.
5. System retrieves relevant order and customer data based on the provided inputs.
6. System presents the retrieved data to the administrator for review.

c) Responses to Abnormal Situations:

Overflow:
If the system encounters an overflow situation during data retrieval or processing, it shall generate an error message indicating the overflow and provide guidance on how to mitigate the issue.

Communication Facilities:
In case of communication failures with the database or external services, the system shall display a notification to the administrator informing them about the issue and suggesting alternative actions.

Error Handling and Recovery:
The system shall implement robust error handling mechanisms to gracefully handle unexpected errors, log relevant information for debugging purposes, and attempt recovery whenever possible.

d) Effect of Parameters:

The system shall utilize input parameters such as order IDs, customer IDs, and date ranges to filter and retrieve specific subsets of order and customer data.
The system shall dynamically adjust the displayed data based on the input parameters provided by the administrator.

e) Relationship of Outputs to Inputs:

Input/Output Sequences:
The system shall ensure that the retrieved order and customer data corresponds accurately to the input parameters specified by the administrator.
Formulas for Input to Output Conversion:
The system shall employ predefined algorithms and database queries to convert input parameters into relevant order and customer data for display to the administrator.

3.2.2.2 The system shall provide administrators with the capability to display information about the supply of raw materials.

a) Validity Checks on Inputs:

The system shall require administrator authentication before granting access to raw material supply information.

Any attempts by unauthorized users to access raw material supply data shall be denied, with appropriate error messages displayed.

b) Exact Sequence of Operations:

Administrator logs into the system using valid credentials.
The system presents an option for accessing raw material supply information.
Administrator selects the option to view raw material supply data.
The system retrieves and displays relevant information about the supply of raw materials.

c) Responses to Abnormal Situations:

Overflow:
If there is an overflow in the displayed raw material supply data due to excessive volume, the system shall implement pagination or scrolling mechanisms to manage the overflow.

Communication Facilities:
In case of communication failures with the database or external suppliers, the system shall display a notification to the administrator, informing them about the issue and suggesting alternative actions.

Error Handling and Recovery:
The system shall handle errors gracefully, displaying informative error messages to administrators in case of data retrieval failures or other unexpected issues.

d) Effect of Parameters:

The system may utilize parameters such as time frames or specific raw material categories to filter and display relevant supply information based on administrator preferences.
The displayed raw material supply data shall reflect the parameters selected by the administrator.

e) Relationship of Outputs to Inputs:

The system shall ensure that the displayed raw material supply information accurately corresponds to the parameters selected by the administrator.
There may be predefined algorithms or database queries used to convert input parameters into relevant raw material supply data for display.

3.2.2.1 Administrators shall have the ability to change and manage prices for items in the store

The system shall allow administrators to adjust the prices of items based on business needs.

a) Validity Checks on Inputs:

The system shall validate administrator credentials before allowing access to order and customer data retrieval.
The system shall validate input parameters such as order IDs, customer IDs, and date ranges to ensure they are within acceptable formats and ranges.
The system shall verify the price has been updated after submission.

b) Exact Sequence of Operations:

7. Administrator logs into the system using valid credentials.
8. Administrator navigates to the store management section.
9. Administrator inputs parameters such as product IDs or product name.
10. System performs validity checks on the inputs.
11. System retrieves relevant product data based on the provided inputs.
12. Administrators shall be able to change the price of an item and submit changes.
13. The System shall update the new price in the database as well as display on the website.

c) Responses to Abnormal Situations:

Overflow:
If the system encounters an overflow situation during data retrieval or processing, it shall generate an error message indicating the overflow and provide guidance on how to mitigate the issue.

Communication Facilities:
In case of communication failures with the database or external services, the system shall display a notification to the administrator informing them about the issue and suggesting alternative actions.

Error Handling and Recovery:
The system shall implement robust error handling mechanisms to gracefully handle unexpected errors, log relevant information for debugging purposes, and attempt recovery whenever possible.

d) Effect of Parameters:

The system shall utilize input parameters such as order IDs, customer IDs, and date ranges to filter and retrieve specific subsets of order and customer data.
The system shall dynamically adjust the displayed data based on the input parameters provided by the administrator.

e) Relationship of Outputs to Inputs:

Input/Output Sequences:
The system shall ensure that the retrieved order and customer data corresponds accurately to the input parameters specified by the administrator.
Formulas for Input to Output Conversion:
The system shall employ predefined algorithms and database queries to convert input parameters into relevant order and customer data for display to the administrator.

3.2.3 Guest Users

Guest users are provided limited privileges on the website. They are granted sufficient permissions to browse the store, place orders, request returns, submit feedback, request a quote/order using a custom design, and contact customer support. However, they do not have privileges associated with having a profile, including saving shipping/payment information and viewing order history,

The requirements given here are the same as for Account-holding Customers (3.2.1.1), with the exception that instead of their data being saved to their account, they are given an order number that can be later used to view the order's information

List of Functional Requirements:

1. Customers who are not logged in shall be able to navigate to the login screen on any page using a button near the top right corner.
2. The login screen shall include fields for the user's email address and password
3. Customers shall be able to navigate to the forgot password screen using a button hyperlink below the fields of the login screen.
4. The forgot password screen shall include a single field for an email address and a button to request a password change.

    a. If the email entered in the forgot password screen is associated with an account, the system will inform the user that a password-change link has been sent to their email. This link expires after 15 minutes.
    b. When the user presses the button to request a password change with an account-associated email address in the email field, the system shall send that email a link to change their account's password.
        i. When the user clicks the link sent to their email, they shall be taken to the "change password" page with two fields: "New Password" and "Confirm New Password".
            1. Under the two fields of the "change password" page, there shall be a button labeled "Confirm".
                a. When the "Confirm" button is clicked, if both fields have text that is identical, the user's password shall be changed to the entered password.
                b. When the "Confirm" button is clicked, if a field is empty or if the passwords don't match, red text shall display telling the user to enter a password and the same password again to confirm.
    c. When the user presses the button to request a password change for an email that is not associated with an account, the system shall display red text that reads "Email entered is not associated with an account".
5. Customers who are not logged in shall be able to navigate to the account registration page on any page using a button near the top right corner (next to the login button)
6. The account registration page shall include a field for an email, a field for a password, and a field to confirm that password.
7. The account registration page shall include a button beneath the fields to confirm account registration.
8. After account registration, the system shall email the account owner welcoming them to the site.
9. After account registration, the user shall be logged into the website with their newly created account.

3.3 Performance Requirements

Static Numerical Requirements

- Number of Terminals to be Supported: The system shall support access from at least 5,000 distinct terminals daily across multiple types of devices.
- Number of Simultaneous Users: The system shall support up to 2,000 users during normal operations.
- Amount and Type of Information to be Handled: The system shall manage a minimum of 25,000 distinct user accounts and their data, such as user profiles and order histories.

Dynamic Numerical Requirements

- Transaction Processing Times: 95% of all transactions, including payments and design submissions, shall be processed in less than 1 second under normal load conditions.
- Data Throughput: The system shall handle data of up to 100 megabytes per second during peak operations.
- Task Completion Times: Order confirmation and notification emails shall be sent to users within 30 seconds of order placement 99% of the time. Design previews shall be generated and displayed to the user within 5 seconds for 95% of all requests.
- Backup and Recovery: The system shall perform daily backups of all user and transaction data, with the capability to restore any lost data within 5 hours of a system failure.
- System Availability: System availability shall not fall below 99% monthly, calculated as the total operational time divided by the total possible operational time.

3.4 Design Constraints

Refer to section 2.4

3.5 Software System Attributes

3.5.1 Reliability

The t-shirt ordering system shall have a mean time between failures of at least 90 days, ensuring that users can consistently place orders without encountering system failures.

The system shall be capable of recovering from failures automatically within 5 minutes to minimize disruptions to the ordering process. If the system is unable to recover all administrators should be messaged.

The system shall support a maximum of 10,000 concurrent users at any point in time.

3.5.2 Efficiency

The system shall process a minimum of 100 t-shirt orders per minute during peak hours to accommodate high demand without significant delays.

The system shall consume no more than 80% of server resources under peak load conditions, ensuring optimal performance and scalability.

The system's database must be performant enough to handle the above transactions

3.5.3 Portability

The t-shirt ordering system shall be compatible with Chrome, Firefox, and Opera on desktop.

The system shall support a mobile interface using mobile browsers, no app is required.

The system shall adjust to the dimensions of the screen it is being displayed on.

3.5.4 Usability

The system shall provide a user-friendly interface with a maximum response time of 10 milliseconds for all user interactions, enhancing the overall user experience.

The software shall enable blind users to navigate the site using a screen reader.

The system shall incorporate a color palette that is friendly to users with colorblindness through clear contrast between colors.

The system shall support the viewing of the website and ordering of T-Shirts in English, Spanish, French, Arabic, Mandarin, and Hindi.

3.5.5 Maintainability

The t-shirt ordering system shall be modularized according to the MVC design pattern to facilitate code maintenance and future enhancements.

The website shall have scheduled maintenance every 3-6 months to ensure that proper updates and bug fixes are executed.

The software shall implement automated testing like unit, integration, and end-to-end testing. As the software is developed, there shall be regular code reviews.

The code shall not emit warnings.

The software shall be developed alongside documentation that includes 10 lines of text per 100 lines of code.

The software shall be developed using the Git version control system to track changes, collaborate, and maintain the codebase's history.