Breast Intentions Inventory Tracking System

Project Report and Clarification

Created by Washington State University Students

InnerVentory Team

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Introduction

I. Project Introduction

Breast Intentions is a Washington State Non-Profit Corporation with 501 (c)(3) status since 2014. They are committed to empowering underserved women by offering professionally fitted bras that help enhance their comfort and their self-esteem. Their mission is to help women of all ages, sizes, and backgrounds regain confidence and dignity by providing expert bra fittings in a fun, supportive, and welcoming environment. BI partners up with a variety of community groups and service organizations throughout the Spokane and the Inland Northwest region to host monthly events. At these events, women receive personalized fittings and leave with two new bras, a garment bag and detailed care instructions to help them maintain their new garments. These events are only made possible through the generous contributions of time, talent and resources from volunteers, donors and community supporters who believe in their mission.

The organization is currently facing challenges with maintaining an efficient inventory tracking system that supports their operations. The system they are using is more suited for businesses, rather than the specific needs of a non-profit. Their current app (Square) makes it difficult to track inventory for bras of various types and sizes. Additionally, they would like to keep a record of all the individuals they've assisted through their professional fitting events. These records would include details such as the individual's original bra size (likely incorrect), the accurate size determined after the fitting, the type of bra provided (e.g., regular, diability, nursing), contact information (if applicable), and the date(s) of fitting sessions attended.

II. Team Members – Bios and Project Roles

Angel Ramirez is a Senior at Washington State University and will graduate with a degree in Computer Science in the Spring of 2025. He was the project lead and focused working on the inventory management system for Breast Intentions. He has interests in cyber security and cyber security policy and has experience in these two areas from his two-summer internships as an Intern at the Department of Energy - Office of Nuclear Energy. Angel's technical skills include proficiency in scripting languages such as HTML and object-oriented languages such as C++ and C#.

Joshna Prasanna Raghavan is a senior at Washington State University, set to graduate in Spring 2025 with a bachelor's degree in computer science and a minor in mathematics. As a key contributor to the Inventory Management System, she developed the essential login/signup functionalities and implemented the 2-Factor Authentication. Enthusiastic about data-driven insights, Joshna is currently doing an online course on Data Analytics. Her technical skills include object-oriented programming languages such as Java and C, along with a solid foundation in SQL and Python. She also enjoys using data visualization tools like Power BI.

III. System Overview

The Breast Intentions Inventory Tracking System – InnerVentory, is a tailored solution designed to support the non-profit's unique need of empowering underserved women by providing professionally fitted bras. As a non-profit, they face distinct challenges in managing both its inventory and its client data, which differ from the needs of traditional businesses. The system is built to help them manage bra inventory and track event participation. The primary goal is to provide an efficient system for organizing bras by type and size while simultaneously maintaining detailed records of the women served at various professional fitting events.

The system addresses several challenges faced by Breast Intentions, including the limitations of their current business–oriented inventory software (Square). Square is effective for transaction-based businesses, but it lacks the flexibility and features required by Breast Intentions. The new system focuses on non-profit needs, such as real-time tracking of inventory and event participation, storing client information (fitting details, bra types), and coordinating volunteer efforts.

The main components of the system include:

1. Inventory Management Module:
    a. This tracks bras by type, size, and quantity.
    b. Real-time inventory updates to ensure that stock levels are accurate before and during events.
    c. Ability to add, update, and remove inventory items, with details on quantities and types available.
    d. Restock alerts to notify administrators when certain sizes or types of bras are running low, helping to ensure that they are always well-prepared for events.

2. Event Tracking Module:

a. Record and store detailed information for each fitting event.
b. Track the number of women served at each event, their original bra size (optional) and their new professionally fitted size (required).
c. Store information on bra types provided, allowing for detailed reporting on the impact of each event.

3. Security Features:
   a. Role Based Access Control - The system ensures that only authorized users (administrators) can make critical changes to the system, such as updating inventory or managing client data.
   b. 2- Factor Authentication (2FA) - To ensure data security, users will be required to enable 2FA.
   c. Data Encryption – Sensitive data such as client information and user credentials will be encrypted to protect it from unauthorized access or breaches.

4. User-Friendly Interface:
   a. The system will be designed with a user-friendly interface to ensure both volunteers and administrators can easily use the platform without the need for extensive training.

The system will be used by the management team, volunteers, and event coordinators. It will provide them with real-time access to the data, enabling them to make informed decisions and deliver better service.

IV. Background and Related Work

Breast Intentions is a non-profit organization that provides essential clothing, specifically bras, to unrepresented women. The organization's focus is tailored to offering professionally fitted bras to women of diverse ages and backgrounds at community events. With the work that Breast Intentions does, it highlights their need for a new inventory and event management system. To achieve their mission, they rely heavily on inventory management systems to track bras by type and size and to document the impact of their services at community events. However, their current inventory management system, Square, does not fulfil their needs as it is software for business transactions, so it lacks the flexibility and features for efficient inventory management for a non-profit organization like Breast Intentions [1]. Square does not allow Breast Intentions to track both – the type and size of the bras given and the people who have received them, which is crucial for Breast Intentions' reporting and prevents them from gauging their impact.

There exists a variety of inventory management systems like FoodBank Manger that have features that allow real-time updates in inventory tracking and volunteer management [2]. There are also other non-profit organizations like Breast Intentions, such as Dress for Success and The Bra Recyclers, all of which rely on inventory tracking systems to track their donations, inventory, and the items given to people [3], [4]. Currently, Breast Intentions uses Bloomerang to coordinate their volunteers which we plan to improve ourselves, as the issue they have is not being able to send SMS reminders/messages to all the volunteers. The state-of-the-art in this field has systems that combine both inventory tracking and client data tracking, which allow non-profit organizations

to better serve their communities and obtain measurable and meaningful data/reports to visualize their impact.

While there are other inventory management systems, they are often not customizable, meaning that a non-profit organization like Breast Intentions cannot tailor the inventory management systems to fit their own needs of tracking both inventory and client information. For example, FoodBank Manager focuses on more of the inventory and donor management but lacks the functionality to track event-specific data such as the number and information of the people who Breast Intentions helps [2].

The inventory tracking system that we plan to create for Breast Intentions would differ from other systems by offering two different types of schemas that they could track. One schema would be for bras by type and size and the other would be for the women served and event data, specifically the women's individual fitting details. This approach to creating an inventory tracking system will allow Breast Intentions with the functionality to manage their inventory, while also tracking the women they serve at the various community events.

To successfully create, implement, and integrate this project, our team must learn some technical skills. We as a team need to learn how to proficiently use the MERN tech stack to create an appealing and easy-to-follow UI for Breast Intentions' management and volunteers, as well as manage the database system where we plan to store their data. Tools for front-end development are crucial when creating a UI that meets the needs of Breast Intentions. Additionally, understanding database management and using it to handle schemas that separate inventory and event data will need to be integrated in our system. We will need to learn how to use a database management system, such as MySQL or MongoDB, that would handle the two schemas we intend to create [5],[6]. Learning how to implement security features, such as role-based access control and security protocols such as two-factor authentication would help us to ensure that Breast Intentions' data is safe, and no unnecessary users will have access to the inventory management system [7], [8]. We believe that the utilization of Transport Layer Security (TLS) encryption would allow us to further secure the sensitive data that Breast Intentions handles [8]. Mastering these tools and systems will enable us to create an inventory management system that would provide Breast Intentions with a solution that is tailored to their needs. By creating a secure and efficient inventory tracking system for Breast Intentions, we will ensure that they have the tools necessary to further support their community efficiently.

V. Project Overview

Breast Intentions, despite its continued success and meaningful impact, is currently facing significant challenges with its inventory tracking system, which is important for its efficient operation of the organization. The application they currently use, Square, is designed primarily for business transactions and lacks the flexibility needed to manage their specific inventory requirements. Since the bras Breast Intentions distribute come in a variety of types and sizes, the current system's limitations make it difficult to accurately track and maintain a comprehensive inventory. This issue may lead to future inefficiencies, affecting their restocking process before their fitting events.

Furthermore, the existing system does not provide a way for them to record and track detailed information of women they help. In addition to the tracking inventory, the organization needs a solution that will allow them to collect and maintain essential data on their clients, such as the bra size they wore before the professional fitting, the correct size they were fitted with, the type of bra they received (regular, disability or nursing), dates of the professional fitting they're attended and their contact details. This type of information helps Breast Intentions stay connected with the people they have assisted. The lack of an integrated system for this "client" information hinders their ability to provide personalized support.

Another key component of the project will be improving the coordination of volunteers, which is essential for Breast Intentions' events. The current system (Bloomerang) does not effectively support volunteer management, particularly in terms of communication. We plan to configure their current system so that Breast Intentions will be able to more efficiently organize and communicate with their volunteers, ensuring that the events are properly staffed and run smoothly. This improved communication will also contribute to the overall success of the events, as volunteers play a crucial role in providing a supportive and welcoming environment for the women who attend.

In conclusion, by developing a secure and efficient inventory, record and event management system, the project will provide Breast Intentions with the tools necessary to better serve their community. The new system will streamline operations, enhance client tracking, and improve volunteer coordination, enabling the organization to empower underserved women more effectively. With a solution tailored to their unique needs, Beast Intentions will be able to continue its work with greater precision and efficiency, ultimately expanding its impact on the lives of the women the help.

VI. Client and Stakeholder Identification and Preferences

The primary client for this project is Breast Intentions, specifically its management team and volunteers, all of whom keep the organization up and running, serving the unrepresented women. They need an inventory tracking system that is tailored to their needs as the one they currently use, Square, does not have the tools and functionality to aid them in their mission of providing women with professional bra-fittings at community events. Breast Intentions needs a system that manages bras by type and size, as well as tracking the number of women served at their events. This would allow Breast Intentions to efficiently manage their inventory, performance, and aid in storing the information of the women they serve, all of which will aid in allocating resources to further meet the community's needs.

The secondary clients will be the volunteers who help check women in or assist with the professional bra fittings. They need an inventory management system that updates quickly in real time, which would allow them to check in women and update any information, such as contact information or bra size and type. Volunteers also need a UI that is readable and easy to use, so that they can fulfill their responsibilities without being held back by the systems they use.

The stakeholders are the women who attend the Breast Intentions' events because they utilize their services and receive bras that fit well and are suited for their needs, such as nursing or

disability bras. The inventory management system must keep track of all the inventory that Breast Intentions has on hand because it ensures the right bra is available when someone needs it and allows Breast Intentions to check what they have too little or too much of. This will ensure that Breast Intentions can serve every woman that needs their services and that they leave events and bra-fittings with comfort and confidence.

The inventory management system should provide Breast Intentions' management team with real-time data on both the inventory and women served at their events to ensure they make informed decisions on their inventory and upcoming events. They want to keep their inventory and the women's information secure and be able to access the system from multiple devices such as computers or mobile devices. They need to have the most control over the entire system as administrators because they will be the only ones to make major changes to the data. They will also need to have a UI that does not require much to learn nor much to use.

For the volunteers, the ease of use and simplicity of the inventory management system is crucial as they are in the front lines and must input any data in the system quickly and efficiently. They need a simple user interface to log in the women they check in, check what they have in the inventory by size and type, and update any information as quickly as they can during Breast Intentions' events. They need to be able to login and access the system from provided devices or their own smartphones as it would allow them to better complete their volunteer responsibilities. The inventory management system should be easy to use that once a volunteer becomes proficient in using the system, they minimize the time they spend entering or updating data/information and can focus on providing personal care and attention to the women they serve.

The inventory management system needs to ensure that inventory is up to date because the women served at Breast Intentions' events need to receive appropriate and well-fitted bras. It should store the women's data and information securely and ensure that they do not wait too long for volunteers to find if they have the size and type of bra they need in stock.

Project Requirements

VII. System Requirements Specification

VII.1. Use Case

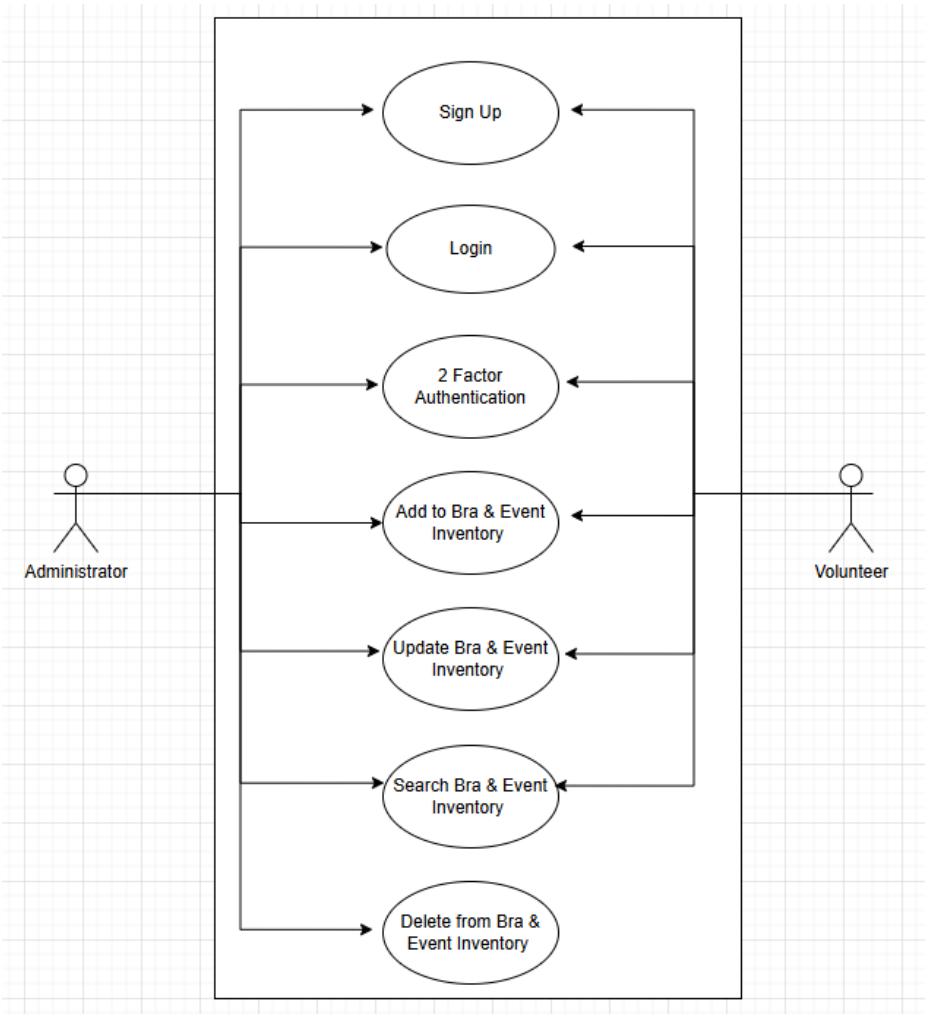


Figure VII.1.1

1. **User New Account Creation** UC01
   Use Case: User Account Creation

- Actors: New user, System
- Preconditions: The user has an account connection and the inventory tracking system's "Sign Up"
- Main flow:
    1. The new user navigates to the "Sign Up" page.
    2. The user enters a valid email address.
    3. The user provides a valid username and password.
    4. The user confirms the password.
    5. The user clicks the "Create Account" button.
    6. The system creates a new account for the user.
    7. The system displays a confirmation message "Account created successfully".

8. The system redirects the user to the login page.

- Alternative flow:
  - If the user leaves a required field blank, the system displays an error message “Please fill out all the required fields” and does not create the account.
  - If the user provides an already registered email or username, the system displays an error message “Email/Username already exists” and prompts the user to enter a different one.
- Postconditions: The new user account is created, and the user is redirected to the login page, or the user is informed about errors in the form they tried to submit.

2. **User Login** UC02

Use Case: User Login

- Actors: User, System
- Preconditions: The user has an internet connection and access to the inventory tracking system.
- Main flow:
  1. The user navigates to the Login page.
  2. They enter their valid login credentials (email and password
  3. The system verifies their login credentials and logs the user in
  4. The system displays a personalized homepage for the logged-in page.
- Alternative Flow:
  - If the user enters invalid credentials, the system displays an error message and prompts the user to try again or reset the password.
  - If the user leaves fields empty, the system prompts the user to enter both the username and the password.
- Postconditions: The user is successfully logged in.

3. **Adding/Removing Items in the Database** UC03

Use Case: Add or Remove Items/People from Inventory

- Actors: User, System
- Preconditions: The user is logged into the inventory tracking system and is on the “Inventory” page
- Main flow (Add):
  1. The user navigates to the “Inventory” page.
  2. The user clicks on the “Add Item” button.
  3. The system redirects the user to the “Add New Item” page.
  4. The user fills in the required fields for the new item.
  5. The user clicks on the “Save” button.
  6. The system adds the new item to the database.
  7. The system displays a confirmation message “Item added successfully”.
- Main Flow (Remove):
  1. The user navigates to the “Inventory” page.

2. The user selects an item from the inventory list.
3. The user clicks on the “Remove” button.
4. The system prompts the user to confirm the removal.
5. The user confirms the removal.
6. The system removes the item from the database.
7. The system displays a confirmation message “Item removed successfully”.

- Postconditions: The inventory is updated to reflect the changes made by the user.

4. **Search Items from the Database** UC04

Use Case: Search Items/People in Inventory

- Actors: User, System
- Preconditions: The user is logged into the inventory tracking system.
- Main flow:
    1. The user navigates to the “Inventory” page.
    2. The user enters the search criteria (e.g. size, type of bra) in the search field available on the “Inventory” page.
    3. The user clicks on the “Search” button.
    4. The system processes the search query and displays a list of bras matching the criteria directly on the “Inventory” page.
- Alternative flow:
    - If no items match the criteria, the system displays a message “No items found” on the “Inventory” page.
- Postconditions: The user can view the search results directly on the “Inventory” page or is notified if no results are found.

5. **2 - Factor Authorization (2FA)** UC05

Use Case: Enable and Use 2-Factor-Authorization

- Actors: User, System.
- Preconditions: The user has entered the valid login credentials into the login page and has permission/access to the Administrator’s email.
- Main flow (Enable 2FA):
    1. The user navigates to the “Account Setting”.
    2. The user enables 2-factor authentication (2FA)
    3. The system sends a 6-digit pin to the Administrator’s registered email.
    4. The user is prompted to enter the correct 6-digit pin.
    5. The system displays a message “2-Factor Authentication enabled”.
- Main flow (Login with 2FA):
    1. The user enters valid login credentials on the login page.
    2. The system prompts the user to enter the authentication code from the email.
    3. The user enters the correct code.

4. The system authenticates the code and logs the user into the system.

- Alternative flow:
    - If the user enters an incorrect 2FA code, the system displays an error message and prompts the user to try again.
- Postconditions: The user is authenticated using 2FA and logged into the system.

6. **Reset Password** UC06

Use Case: Reset Password

- Actors: User, System
- Preconditions: The user has forgotten their password and has access to their registered email.
- Main flow:
    1. The user navigates to the “Forgot Password” page.
    2. The user enters their registered email address.
    3. The user clicks on the “Reset Password” button.
    4. The system sends a password reset link to the user’s email.
    5. The user clicks on the link to their emails and is redirected to a password reset page.
    6. The user enters a new password and confirms it.
    a. The system updates and display a confirmation message “Password reset successfully”.
- Alternative flow:
- If the user enters an unregistered email, the system displays an error message “Email not found”.
- Postconditions: The user’s password is reset, and they can log in with their new credentials.

7. **Logging Out** UC07

Use case: User Logout

- Actors: User, System
- Preconditions: The user is logged into the inventory tracking system
- Main flow:
    1. The user clicks on the “Logout” button.
    2. The system logs the user out and redirects them to the login page.
- Postconditions: The user is logged out of the system and must log in again to access the inventory.

VII.2. Functional Requirements

Functional requirements are the aspects and functionality that the inventory management system we intend to create must need to meet the needs of Breast Intentions and their staff. These

requirements lay out the functions and various aspects of the system and how it would support the Breast Intentions' mission of helping underserved women. Each requirement will be grouped into a main module that details a main component of the system, and these requirements listed will provide the client's needs and what components we will ensure that the system has to meet these needs. For each requirement, we list the priority level, with 0 being an essential and unquestionable aspect and 5 being a goal if we can create it. Ensuring that we address each function al requirement, we will lay out a blueprint that will ensure that the system we create will meet the needs of Breast Intentions and further support its mission to serve underserved women.

VII.2.1. Inventory Management Module

Track Bra Inventory by Type and Size

- **Description**: The system must track the inventory of bras categorized by type and size.
- **Reason**: Based on Breast Intentions' need to track the types and sizes of bras available in their inventory.
- **Priority**: Priority Level 0 since it is essential and must be implemented.

Add, Update, and Remove Inventory Items

- **Description**: The system must allow users to add new inventory, update quantities, edit items, and remove inventory items as needed.
- **Reason**: This will allow the Breast Intentions staff to keep track of their stock efficiently to meet their clients' demands.
- **Priority**: Priority Level 0 since it is essential.

VII.2.2. Event Tracking Module

Track Events and Participants

- **Description**: The system must keep track of the events hosted by Breast Intentions and the participants who attended and got a professional bra fitting.
- **Reason**: Allows Breast Intentions to track of the number of women they helped at their events, as well as keeping their information for returning clients and user testimonials.
- **Priority**: Priority Level 0 since it is essential.

Add, Update, and Delete Events

- **Description**: The system must allow users to create, update, and delete events in the system.
- **Reason**: Allows for Breast Intentions to manage and keep track of the woman that attended certain events.
- **Priority**: Priority Level 0 since it is essential.

VII.2.3. User Management Module

Create and Manage User Accounts

- **Description**: The system must allow administrators to create, update, and remove user accounts with different access levels such as volunteers.
- **Reason**: This will provide security and keep data safe for Breast Intentions' staff.
- **Priority**: Priority Level 0 since it is essential to keep data safe.

Assign User Roles

- **Description**: The system must allow everyone who has an account to hold specific user roles, such as administrator and volunteers, all of which will have various levels of access to the system.
- **Reason**: Keeps data safe and allows only authorized users to make significant changes to the system.
- **Priority**: Priority Level 0 since it is essential to keep data safe.

VII.3. Non-Functional Requirements

Non-functional requirements are the attributes that determine the system's quality, usability, and performance. Non-functional requirements include system properties such as security, scalability, and ease of use. In addition to general properties, non-functional requirements are also the programming languages we intend to use, one of which is JavaScript. These requirements ensure that the system can function properly and also meets the standards of performance and usability.

System Reliability

- **Description**: The system will ensure that it is always and constantly available to Breast Intentions' staff.
- **Priority**: Priority Level 0 since this is essential.

Data Security

- **Description**: The system will authenticate users and encrypt client and users data to ensure the confidentiality and safety of the data being stored.
- **Priority**: Priority Level 0 since this is essential.

Scalability

- **Description**: The system shall be scalable to be able to handle bigger inventory and more events as the organization grows and continues to update their inventory and events.
- **Priority**: Priority Level 1 since we want to ensure the organization can grow.

Usability

- **Description**: The system will have a user-friendly User Interface (UI) to ensure that users can navigate and do what they need without needing formal training.
- **Priority**: Priority Level 1 since we can create a basic UI and then take input from users to improve.

VIII. System Evolution

The system evolution section describes the current state of software and computing technology and how these can evolve and change. Modern technology, user needs, and the growth of the organization can cause the need for the system to improve and adapt to these changes. This section will tackle and identify these potential changes in the software of our system, user requirements, and outside harm and risks that could impact the system. If we can identify these changes, we can design a system that will allow it to be updated, which will ensure scalability. In all, this section will highlight the need for an adaptable system that can grow alongside Breast Intentions' organization and will ensure that we create a system that successfully supports the organization.

1. **Increase In Inventory Needs**: As Breast Intentions grows, the system must handle a larger inventory and more diverse product categories. We hope to create a system that will organize the increase of inventory and several types of bras.
2. **User Growth**: If more users, such as volunteers, use the system, it must scale efficiently to be able to handle higher traffic and data volumes. The system should be designed to support this growth without any performance issues.
3. **User Access Changes**: As the organization expands, there should be a difference and diversity to user roles. This would require us to make new roles for users that would give everyone different permissions to the system.
4. **Software Updates**: As software and hosting websites update, the system must ensure that it can handle any updates and stays available.

IX. Architecture Design

IX.1. Overview

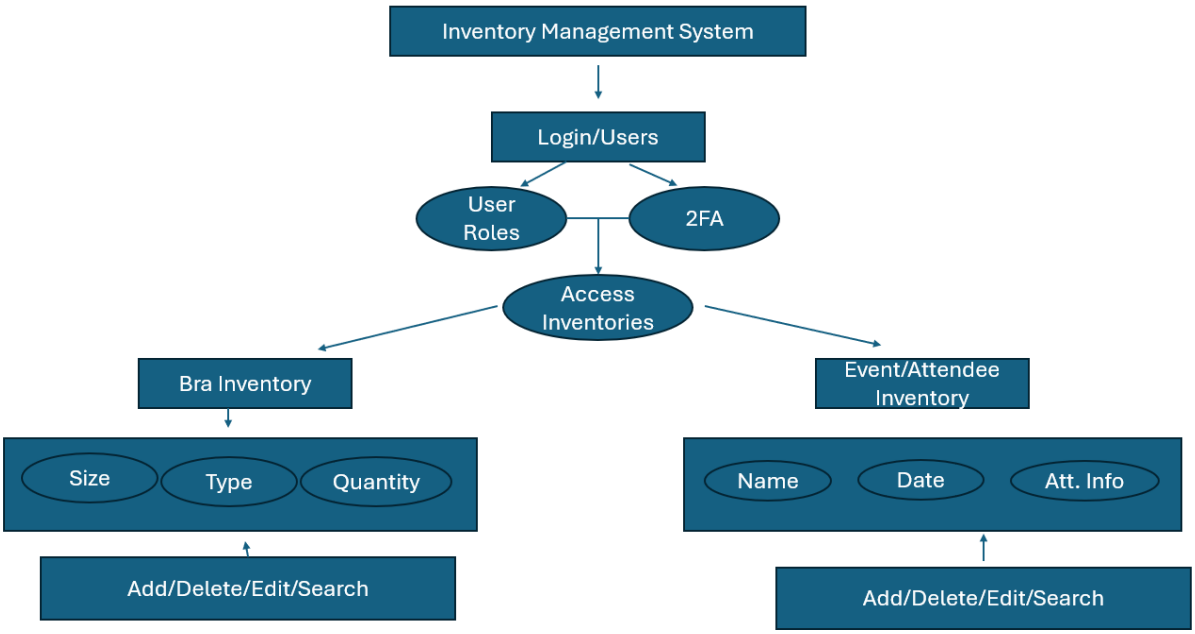


Figure VIII.1.1

The above diagram, Figure VIII.1.1, illustrates the architecture for the inventory tracking system we've designed to support the unique needs of our client through modular components that manage inventory, event data and user accounts. The system is built using the MERN stack (MongoDB, Express.js, React.js, Node.js), ensuring that it is scalable, secure, and easily manageable.

Each subsystem operates independently while interacting to form a cohesive solution. The database, managed by MongoDB, stores information related to bra inventory, event participation, and user credentials.

IX.1.1 Inventory Management Subsystem

The Inventory Management Subsystem is responsible for managing the bra inventory that Breast Intentions distributes during their events. It tracks the bras by type (e.g., regular, nursing, disability) and size (e.g., 32A, 34B, 36C), and allows the users to add, update, and remove items are needed.

Responsibilities:

- Track and update bra inventory.
- Provide real-time inventory levels to event coordinators and volunteers.

- Send alerts when specific sizes or types of bras are running low.

Interaction with other subsystems: The inventory data is accessible by the Event Tracking subsystem, which updates the stock based on the bras distributed at events. It also allows the User Management Subsystem to restrict access to certain inventory functions based on user roles.

IX.1.2 Event Tracking Subsystem

The Event Tracking Subsystem manages all information related to the fitting events hosted by Breast Intentions. It records event details (e.g., date, location) and participant data, including the bra size before (optional) and after the fitting (required), and stores this data for reporting and follow-up purposes.

Responsibilities:

- Track event details and participant data.
- Record fitting results (bra size before and after, type of bra provided).

Interaction with other subsystems: This subsystem interacts with the Inventory Management Subsystem to update inventory based on the event outcomes.

IX.1.3 User Management Subsystem

The User Management Subsystem controls user authentication, authorization, and role management within the system. It ensures that only authorized users can access specific features, such as adding inventory or accessing client data.

Responsibilities:

- Manage user accounts, roles, and permissions.
- Support 2-factor authentication (2FA) for enhanced security.
- Control access to inventory and event data based on user roles.

Interaction with Other Subsystems: The User Management Subsystem is tightly integrated with both the Inventory Management and Event Tracking subsystems to ensure that only authorized users can make changes to inventory or event data.

IX.2. Subsystem Decomposition

1. Inventory Management Subsystem

Description: This subsystem manages all aspects of inventory tacking, allowing administrators and authorized volunteers to manage stock efficiently.

Components:

- Inventory Database – Stores all data on bras, including type, size, and quantity.
- Inventory API – Provides CRUD (Create, Read, Update, Delete) operations to manage inventory.

Concepts and Algorithms:

- Real Time Updates – The system continuously updates inventory levels based on bras distributed at events.

2. Events Tracking Subsystem

Description: This subsystem manages event data, including participants, the bras distributed, and the volunteer roles.

Components:

- Event Database - Stores data related to the event, including dates, locations, and participant details.
- Event API – Facilitates the creation, updating, and deletion of events within the system.
- Participant Tracking – Allows for the detailed tracking of each attendee's fitting experience, storing information such as the bra size before and after fitting, and the volunteer who assisted.

Concepts and Algorithms:

- Participant Matching – If a returning client attends another event, the system can match their previous record to track their fitting history.

3. User Management Subsystem

Description: This subsystem manages all user- related activities, ensuring that roles and permissions are appropriately assigned to protect sensitive data.

Components:

- User Database – Stores user credentials, roles, and permissions
- Authentication and Authorization API – Handles user login, authentication (with support for 2-factor authentication), and role-based access control.

Concepts and Algorithms:

- Role-Based Access Control – Ensures that only authorized users can access sensitive features (e.g., modifying inventory, viewing participant data).
- 2 Factor Authentication – Adds an extra layer of security, requiring users to authenticate through a secondary method such as Google Authenticator.

X. Data Design

Our inventory management system will utilize MongoDB as the database system to store bra information, event/attendee information, as well as user credentials. Using MongoDB allows us to create schemas to store every instance of an object within both inventories and every user. MongoDB allows us to manipulate the data on how we want it to be and when we want, which will be essential to meeting the needs of the team at Breast Intentions. Utilizing these schemas, we can create them based on each object we want to store, such as bras, events and attendees who attended the events, as well as user login credentials. Having schemas will be critical to managing both databases and managing all the user credentials in our inventory management system. As mentioned before, we will utilize schemes to store the client's data, which could be described as such:

Bra Inventory Schema

In the bra inventory, we will implement a schema to store the following information:

- **Type** (string): The type of the bra (Normal, Nursing, Disability, etc.).
- **Size** (string): The type of bra (34B, 36C, etc.).
- **Quantity** (int): The number of bras available in the inventory for each type and size combination.

We have the schema set up this way so that the user can distinguish between each item in the bra inventory. It also allows us to set up the database in a way so that when we use HTTP methods, such as POST, DELETE, GET, PUT, to add, edit, and remove any item in the bra inventory. Having the schema this way also allows us to update just the quantity of a specific bra if a user inputs a bra with a size and type combination that already exists in the inventory.

Event/Attendee Inventory Schema

In the event and attendee inventory, we will use a schema that includes the following information:

- **Name** (string): The name of the event.
- **Date** (Date): The date on which the event will occur/ed without the timestamp.
- **Attendees** (Array): This will store detailed information for each attendee, including:
    - **Name** (string): The attendee's name.
    - **Size Before** (string): The bra size the attendee was wearing before fitting.
    - **Size After** (string): The attendee's actual bra size after fitting.
    - **Fitter's Name** (string): The name of the fitter who assisted the attendee.
    - **Phone Number** (string): The attendee's phone number.
    - **Email** (string): The attendee's email address.

Similarly to the bra inventory, this schema allows a user to distinguish between each event and the attendees that attended events. This will also allow us to add, edit, or delete events and attendees whenever the user, with the proper permissions, wants to. Having the attendee information store inside an array will make it easier to show the event and attendee information in the event/attendee inventory.

User Credentials Schema

To store the user credentials in our MongoDB database, we will create a schema that stores the following:

- **Username** (string): The username of the user.
- **Password** (string): The password of the user that will be encrypted.
- **Role** (String): The role of the user (Volunteer or Admin).

We will store user's credentials this way so that we can secure not only their credentials, but also the inventories from unwanted access. We also added the user's role so that only the administrators can make major changes, such as adding/removing new users.

These schemas will allow us to efficiently track inventory levels and track/manage event attendance, which would satisfy the needs of the team at Breast Intentions.

XI. User Interface Design

The User Interface (UI) for the Breast Intentions inventory and event management system will be designed to be user-friendly, while providing efficient functionality for both volunteers and management. The web application will be hosted on GoDaddy, with MongoDB Atlas serving as the database system to store and manage all relevant bra, event/attendee, and user data. This setup allows for reliable access to the application and data from any device with internet.

Launch and Usage

Users will be able to access the web application through a browser, with no additional installations required, to ensure simplicity. The following details will outline the process for starting and using the application:

- **Hosting and Access:**

  The application will be hosted on GoDaddy, allowing users to reach it by visiting a URL.

- **Login and Signup:**

  Users will access the Login page once they travel to the URL and then be prompted to enter their credentials or navigate to the Signup page to create a new account if they are a new user. The application will implement Google authenticator to authenticate users and verify their identity to protect user data, Breast Intentions' own data, as well as their client's data.

Main Pages

The website will consist of five main pages for users to navigate to and use. Each except the Login and Signup pages will have a UI Mockup:

1. **Login:**

This page will provide an interface for users to enter their credentials. A password recovery option will be available for users to create a new password. This page will also contain an authentication step to verify user's identities. See Appendix A – Figure 1.

2. **Signup:**
   The signup page will allow new users to register for an account by providing their name, email address, and password. It would also prompt users to download the Google Authenticator app on their personal device. See Appendix A – Figure 2.

3. **Reset Password:**
   This page will allow a user to reset their password if they do not remember as long as they present their correct credentials. They just need to enter their username and then authenticate with Google Authenticator See Appendix A – Figure 3-5.

4. **Home:**
   The home page will serve as the main page, giving the users a small set of instructions and quick access to the inventories. See Appendix A – Figure 6.

5. **Bra Inventory:**
   This page will display the bra inventory, including details about each item such as the type, size, and quantity of each bra in the inventory. Users will be able to add new items, update existing items, and view current quantities of each bra they have on hand. This page will also have a search feature that will allow users to search bras by type or by size. See Appendix A – Figure 7.

6. **Event Inventory:**
   This page will allow users to enter new events and manage attendee information, entering new attendees the day of the event. Users can view the event details, such as the date and the names of attendees, along with their sizing information before and after the event and contact information. This page will also have a search feature that will allow users to search by events, which will show that specific event a user is looking for and display all the attendees that attended that event. Apart from this, a user can search by attendee which will only show the specific attendee and what events they attended. See Appendix A – Figure 8.

Components and Features

- **Navigation Bar:**
  This will allow a user to easily navigate between pages and will be present on all pages except the Login and Signup pages.
- **Success Messages:**

Users will see a success message for any action they do such as bra/event added, bra/event edited, and for when a user deletes a bra or event. This also applies when a user adds, edits, or deletes an attendee.

- **Search Bars:**
  Both inventories will have search bars that will allow users to quickly locate specific bras, events, or attendees.

Use Cases Utilizing the Interface

- **User Authentication:**
  Users will interact with the Login and Signup pages to securely access the application. They will also need to authenticate their identities using Google Authenticator.
- **Inventory Management:**
  The bra inventory page will enable users to add, update, search for, and delete bras in the inventory.
- **Event Tracking:**
  The event inventory page will allow users to add, update, search for, and delete events and attendees in the inventory. This will mainly be used as record for Breast Intentions to know the events they host, as well as the many women they assist at these events.

XII. Testing and Acceptance Plans Introduction

XII.1. Project Overview

Our project will require the design and development of an inventory management system for Breast Intentions. Our inventory management system will have two main components:

1. **Bra Inventory**: Tracks bras by size, type, and quantity to ensure that the Breast Intentions team can effectively and efficiently manage their items on hand.

2. **Event Management**: This tracks all the events and the people who attended the events that Breast Intentions hosts.

Key functionalities include:

- **CRUD operations (GET, POST, DELETE)** for both bra inventory and events.

- **Search functionality** that allows for quick search of an item, event, or attendee.

- **User Interface** that is user-friendly and easy to use.

Testing all these key functionalities within our inventory management system will ensure that we have easy navigation between inventories (pages), consistent requests and responses, and real-time updates to support smooth operations during events.

XII.2. Test Objectives and Schedule

The main goal of our test plan is to ensure that our inventory management system is efficient, reliable, and user-friendly. Our testing plan has many phases, so that we can focus on various aspects of the system including the UI, database integration, core functionality, and security features. The main objective of our test plan is to identify and resolve any bugs or issues to ensure that Breast Intentions has quality user experience.

The required resources for our test plan will include a testing environment, access to the latest build of the system, test user accounts, and tools for automated and manual testing. Additionally, we will require access to documentation outlining the system's functionalities, use cases, and testing procedures.

This is our planned schedule for testing (Subject to change):

Testing Phase 1 (11/1/24): The first phase will focus on testing the UI for functionality and responsiveness. We will need to verify that all UI elements work correctly and gather user feedback on the design and usability. This phase will result in a refined UI that addresses any identified issues. We hope to also use the feedback from our client to ensure that we design the UI that works best for Breast Intentions.

Testing Phase 2 (11/15/24): The second phase will test the core inventory tracking features for both inventories, including adding, updating, deleting, or searching for items or events. The objective is to ensure these functionalities work accurately and reliably.

Testing Phase 3 (11/29/24): The final phase will focus on security and user authentication testing. Major tests will include testing the two-factor authentication (2FA) process, verifying TLS encryption for secure data transmission, and performing user acceptance testing (UAT). The goal is to leave with a secure system that has all of the security features up and running.

The major milestones throughout the testing schedule are:

- Completion of UI testing and initial feedback integration (11/15/24)
- Fully functional core inventory tracking features (11/29/24)
- Final security checks and user acceptance testing completed (12/13/24)

Throughout the testing phases, we will refine our code and update documentation to ensure that we stay consistent. The comprehensive testing schedule ensures that the inventory management system is properly working and can handle the day-to-day operations of Breast Intentions.

XII.3. Scope

This document will outline our testing strategy for the Breast Intentions' inventory management system as it describes our goals, tools, and a general schedule in order to test the website's performance. We also want to be able to ensure that this will work flawlessly when the users are able to login and utilize the inventories. The purpose is to ensure the final product meets Breast Intentions' expectations, supports seamless operations, and does not have any major errors.

XIII. Testing Strategy

For our project we are using Continuous Integration (CI) because as each of us adds a section or feature to the code, we will merge it into the project and see how it affects the system as a whole. Sometimes adding in a new feature or UI aspect has led to the entire system going down and to prevent this, we have a backup of the code to prevent any downtime in our system. This also prevents our database from having noisy data inside of it as it will only enter data that is validated before being inserted into the database. Having data that the system can't read can lead to major problems or even keep the program from running. We are preventing this using the schema and requiring all fields before the data is allowed into the database. Overall, we are making sure we have at least one version of our code up and running and having another that we are testing on so that we can add any features we want. Once something from our test system has a working functionality, we then add this code to our main version and repeat the process.

XIV. Test Plans

The Unit testing for InnerVentory will focus on the individual components and functions:

XIV.1. Unit Testing

Unit Testing for our project will focus on individual components and functions:

1. Inventory Management Module:

Test CRUD operations (GET, POST, DELETE) for bra inventory items.

Verify stock level updates.

Validate search functionality for inventory items.

2. Event Management Module

Test CRUD operations for event records.

Verify attendee data entry and retrieval.

Validate event search functionality.

3. User Interface Components:

Test individual UI elements for proper rendering and functionality.

Verify form validations and input handling.

4. Security Module:

Test user authentication functions.

Verify role-based access control logic.

XIV.2. Integration Testing

The integration testing of the project will ensure seamless interaction between InnerVentory's modules:

1. **Inventory and Event Management:**
Test inventory updates after event completion.

2. **User Interface and Backend:**
Test API calls from UI components to backend services.
Verify data flow and state management across the application.

3. **Security and User Interface:**
Test role-based access to different modules.
Verify authentication flow and session management.

XIV.3. System Testing

XIV.3.1. Functional Testing

The functional testing will verify that InnerVentory meets all the specified requirements.

1. Inventory Management:

Complete cycle of adding, updating, and deleting inventory items.

Verify search functionality across the inventory.

2. Event Management:

Create, manage and close events.

Record and retrieve attendee data.

3. User Interface:

Verify navigation between different inventories (pages).

Test responsiveness and usability across different devices.

4. Security Features:

Test user registration, login and two factor authentication.

Verify data access based on user roles.

XIV.3.2. Performance Testing

The performance testing will ensure that InnerVentory can handle expected loads:

1. Load Testing:

Simulate multiple concurrent users managing inventory and events.

Test system response times under various user loads.

2. Stress Testing:

Push the system beyond expected capacity (e.g. large inventory updates, etc.).

Identify system breaking points and recovery capabilities.

3. Security Testing:

Verify TLS encryption for secure data transmission.

Test the robustness of the two-factor authentication system.

XIV.3.3. User Acceptance Testing

The User Acceptance Testing (UAT) will involve Breast Intentions staff and volunteers:

Scenario Based Testing:

Create real world scenarios (e.g., managing a fitting event with our system)
Having users' complete tasks and provide feedback.

Usability Testing:

Evaluate the user interface for intuitiveness and ease of use.
Gather feedback on layout, navigation, and workflow.

Functionality Verification

Confirm all features meet Breast Intentions' specific needs.
Validate accuracy of inventory tracking and event management.

UAT will be conducted in a controlled environment mimicking real-world conditions. Feedback will be collected through surveys (and direct observation?).

Throughout all testing phases, we'll employ Continuous Integration (CI) practices to ensure rapid feedback, allowing us to identify and resolve issues quickly, maintaining a high quality, reliable system throughout the development process.

XV. Environmental Requirements

The testing environment for the inventory tracking system must include both necessary and desired properties to ensure accurate testing. The specification of the test environment includes various elements, including hardware, communication systems, and software requirements.

Hardware Requirements

1. **Hosting Provider:**
    - We will use GoDaddy to host the web application and database.
    - GoDaddy has a shared hosting plan, which we plan to use since it can provide server management and extra security.
2. **Servers**:
    - Specifications: Minimum 8 GB RAM, 4 CPU cores, 500 GB SSD storage. Small and general requirements.
3. **Client Devices**:
    - Includes desktop computers and laptops with different operating systems (Windows and macOS).
    - Also includes the mobile devices that the Breast Intentions' team has.

Communications

1. **Network**:
    - Need a high-speed internet connection to ensure smooth access, use, and testing of the web application.
    - Secure Wi-Fi and Ethernet connections to support various testing scenarios, including remote access.

System Software

1. **Operating Systems**:
    - Windows 10/11, macOS.
2. **Database Management System**:
    - MongoDB Altas for managing both of the inventories databases.

Mode of Usage

1. **Stand Alone Mode:**

- The website will be fully hosted on GoDaddy without any local servers from our own devices.
- Access will be through a public domain from GoDaddy.

Software Requirements

1. **Development Tools**:
   - Integrated Development Environment (IDE) such as Visual Studio Code.
2. **Version Control System**:
   - GitHub and Git for managing source code and collaboration.
3. **Testing Tools**:
   - Postman for API testing.

XVI. Alpha Prototype Description

1. Landing Page

This is the main entry point to our Inventory Management System – InnerVentory. We have two options for users here. Users can select either Login or Sign Up (depending on whether they are existing users or not)

1.1. Login Page

Clicking on the Login button on the Landing page redirects our users to the Login Page where they can enter their valid credentials to gain access to the system. Once they have successfully logged in, they are redirected to the Home Page.

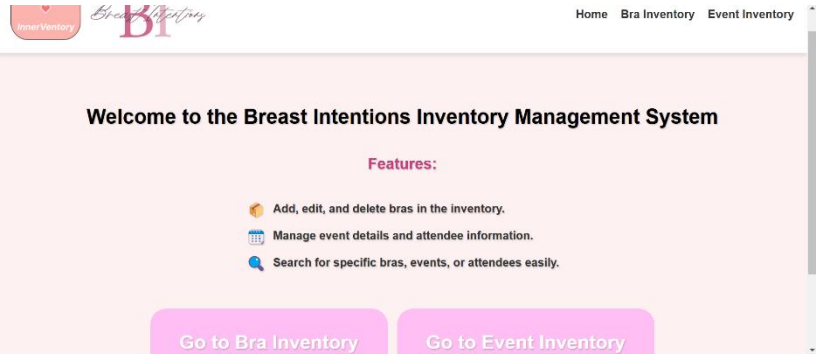
1.2. Sign Up/Register Page

Clicking on the Sign-Up button the on the Landing page redirects our users to the Signup page where they can enter their details to become registered users of the system. Once they have successfully logged in, they are redirected to the Home Page.

2. Inventory Management System

2.1. Home Page

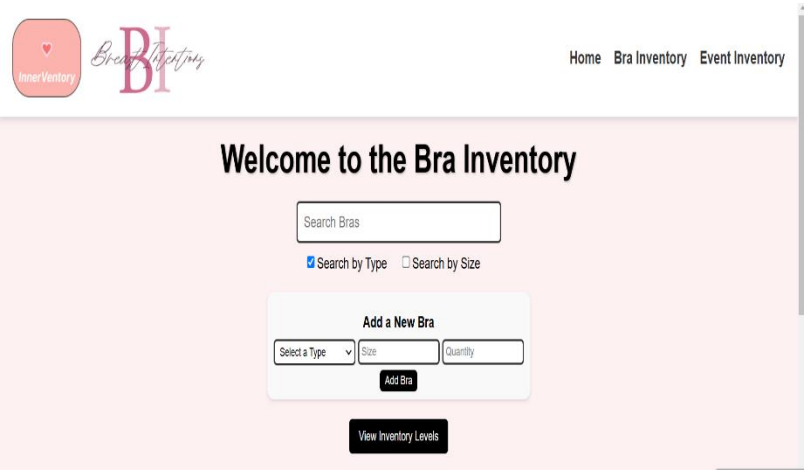
2.1.1 Navigation



The homepage will just show a brief description of the website but, mainly be used to navigate to either inventory, bra or event, from either the nav bar at the top right or the buttons located front and center of this page.

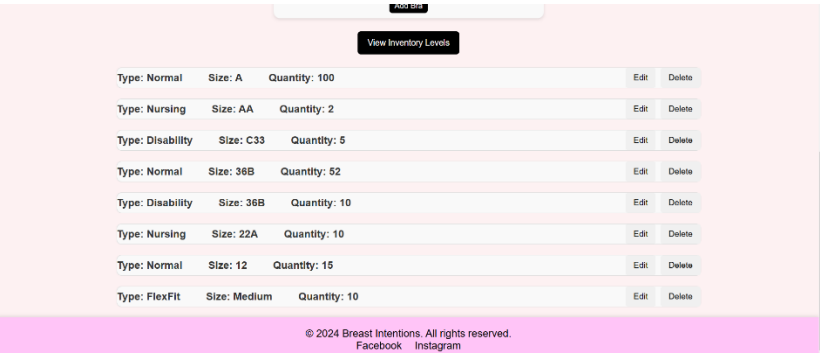
2.2 Bra Inventory

2.2.1 Add/Search Items & Inventory Level



The Bra inventory will allow users to enter a new item in the inventory where they can set a type, size, and the quantity of an item they are entering. This page will allow a user to search by type or size of item they want to search for and this page will filter out the specific items based on what the user searches for. There is also a button that allows the user to see the inventory levels.

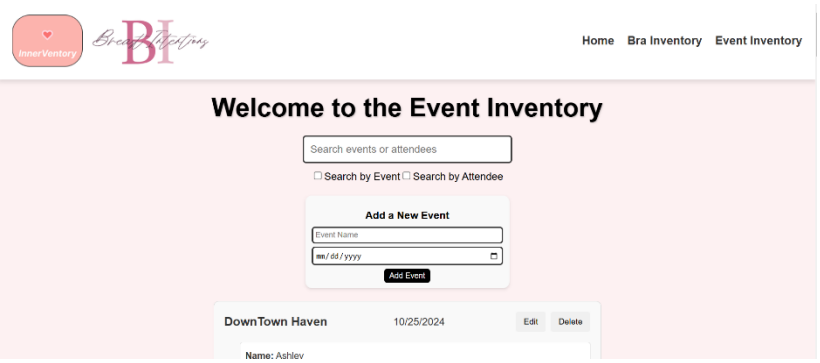
2.2.2 Item List



This will show a user the list of items where they can either edit or delete an item from the list. This will also show the filtered list based on what the user searches for.

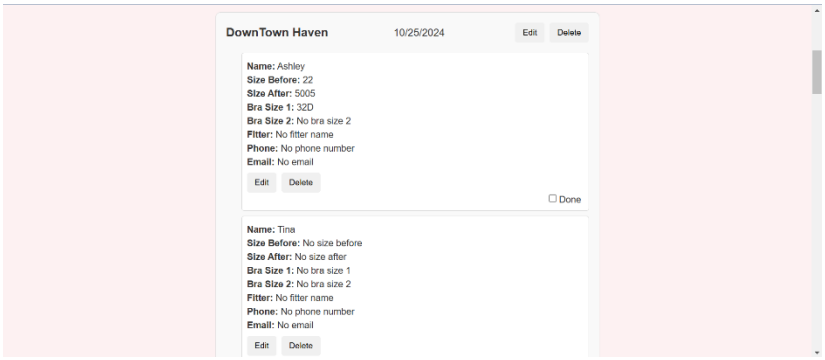
2.3 Event Inventory

2.3.1 Add & Search for Event/Attendees



A user will be able to add an event, including the event name and the date the event will take place. A user will also be able to search for a specific event or attendee.

2.3.2 Event/Attendee List



This is where a user can see an event and the attendees that were at the event. Here they can edit either the event info or the attendee information as well. Only the admin users will have the ability to delete items from this page.

XVII. Alpha Protype Demonstration

We have shown the client what we have so far, which is essentially just the inventory pages. The client is satisfied with what Angel has done so far, and they have some suggestions that will be discussed in the next section that he will add in the coming months. So far, adding, editing, deleting, and searching is working for both inventories but, the only pressing issue is the search functionality for the event inventory which is already being worked on by Angel.

XVIII. Future Work

This is a list of some features that the client wants us to incorporate:

- Having the bra inventory updated based on the inputs in the bra sizes that the attendee takes home from the event inventory.
- Having a log that shows which user adds, edits, or deletes from either inventory from a convenient list of actions that those with admin roles can look at.

- Looking for attendees that have attended an event in the past year to ensure that Breast Intentions' staff is aware of those who want to abuse their services.
- 2 Factor Authentication for the system to ensure safety and that the Administrators know when someone is trying to access the system.

XIX. Glossary

Continuous Integration (CI): This is a software development practice that is the process of merging code changes from multiple contributors into a single project.

Hypertext Transfer Protocol (HTTP): This is an application protocol that allows user to communicate and see data on the web.

GET: This is used to retrieve data from a server.

POST: This is used to send data to the server to create a new resource.

PUT: This is used to update or replace an existing resource.

DELETE: This is used to remove a resource from the server.

Inventory Management System (IMS): This is a software that is used to track inventory levels and distribution of items.

JavaScript: This is a versatile programming language primarily used for adding interactivity and dynamic behavior to web pages.

Schema: This is a database structure that formats how data is stored and accessed.

Square: Business-focused software for payment processing and basic inventory management.

MySQL: A database management system that utilizes structured query language (SQL).

MongoDB: A NoSQL, document-based database system used for flexible data storage.

Front-end Development: This allows the creation of user interfaces and interactive elements in a software application.

Back-end Development: The development of server-side logic and database interaction for an application.

Role-Based Access Control (RBAC): A system where users are given permission based on their roles.

Scalability: This is the ability of a system to handle changes such as data size or demand and being able to adapt to recent technologies easily.

Two-Factor Authentication (2FA): A security measure where users verify their identity using two factors such as password and SMS messages.

Transport Layer Security (TLS): A protocol ensuring secure communication between users and a server.

User Acceptance Testing (UAT): This is a stage within software development process where the intended users test the software in real-world conditions to ensure it meets their needs.

Uniform Resource Locator (URL): This is known as an address on the web, which is also a reference to a resource that specifies its location on a computer network.

User Interface (UI): The part of an application users interacts with, like buttons and forms.

XX. References

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XXI. Appendices

XXI.1. Appendix A (Page Designs)

Figure 1: Login Page UI

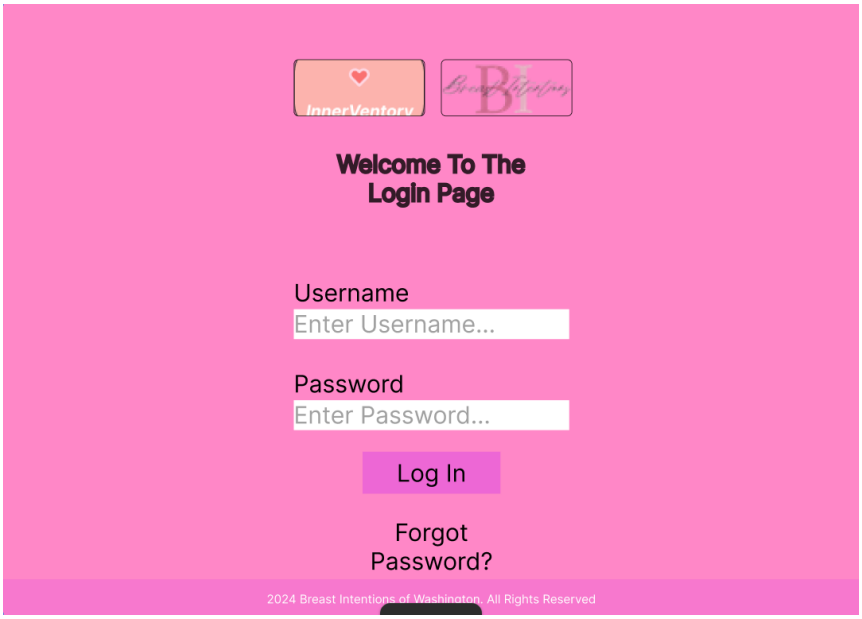

Figure 2: Signup Page UI

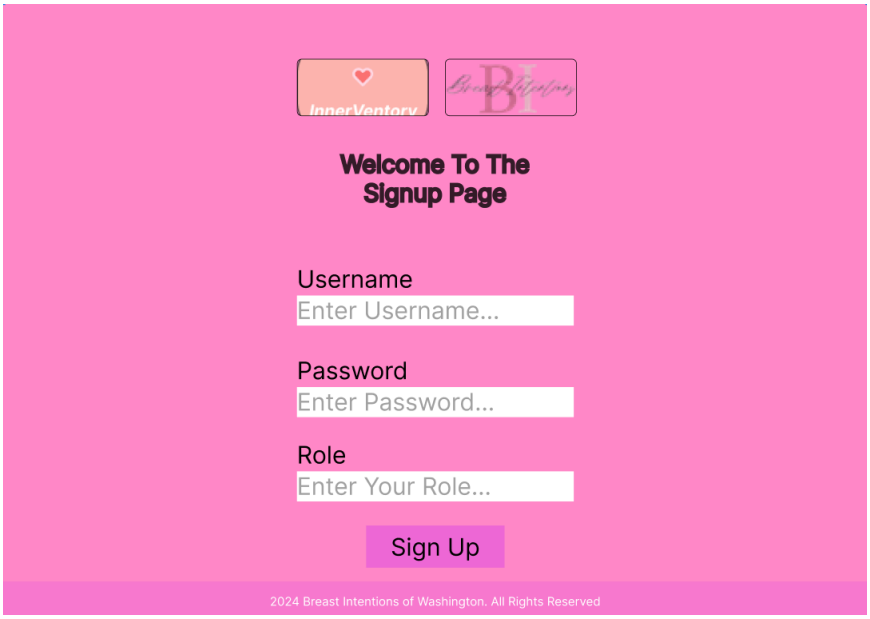

Figure 3: Reset Password Page UI

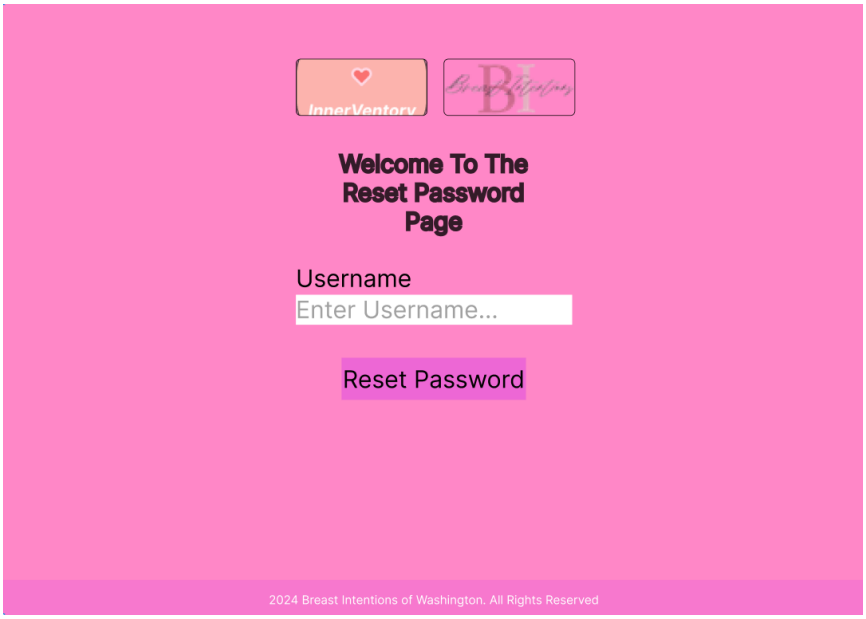

Figure 4: Reset Password Verify Page UI

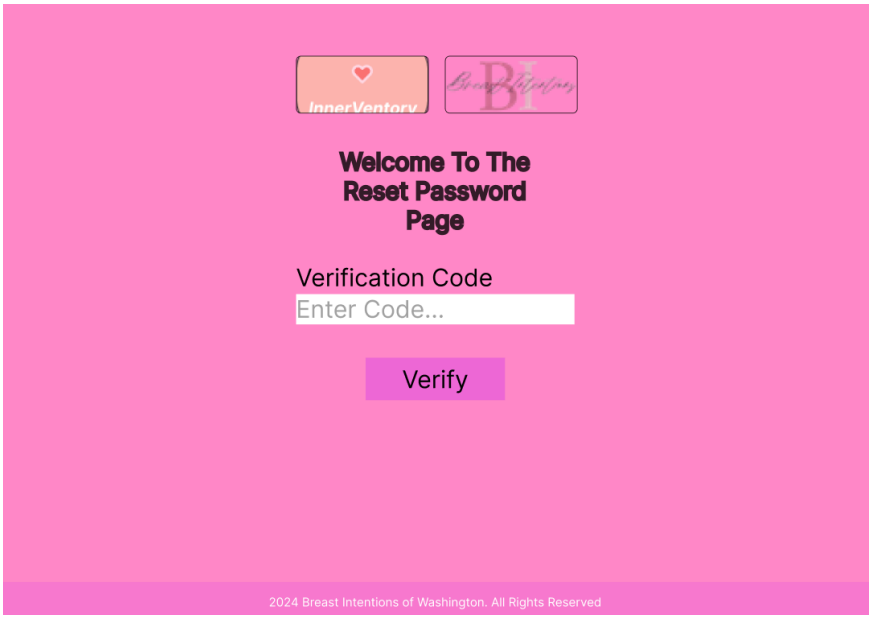

Figure 5: Reset Password New Password Page UI

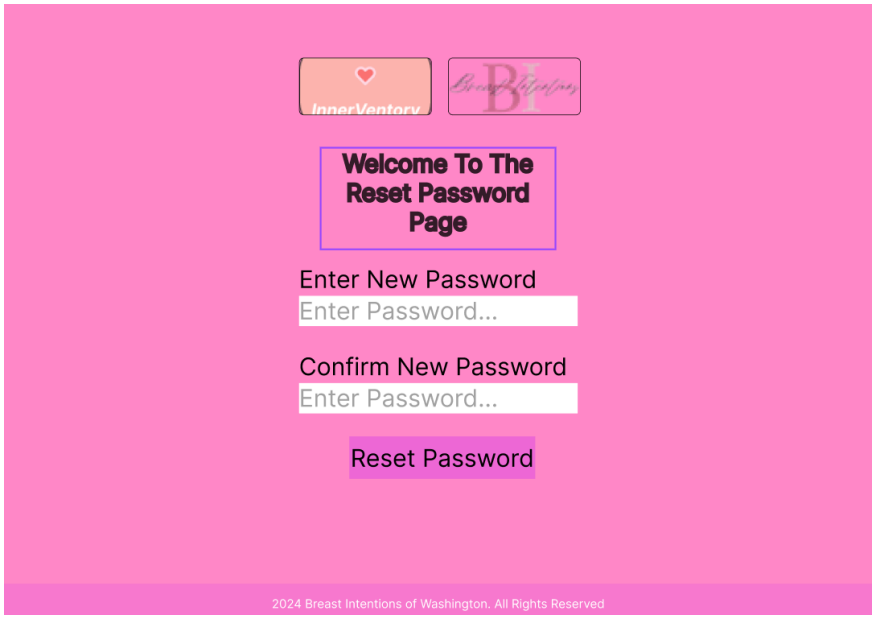

Figure 6: Home Page UI

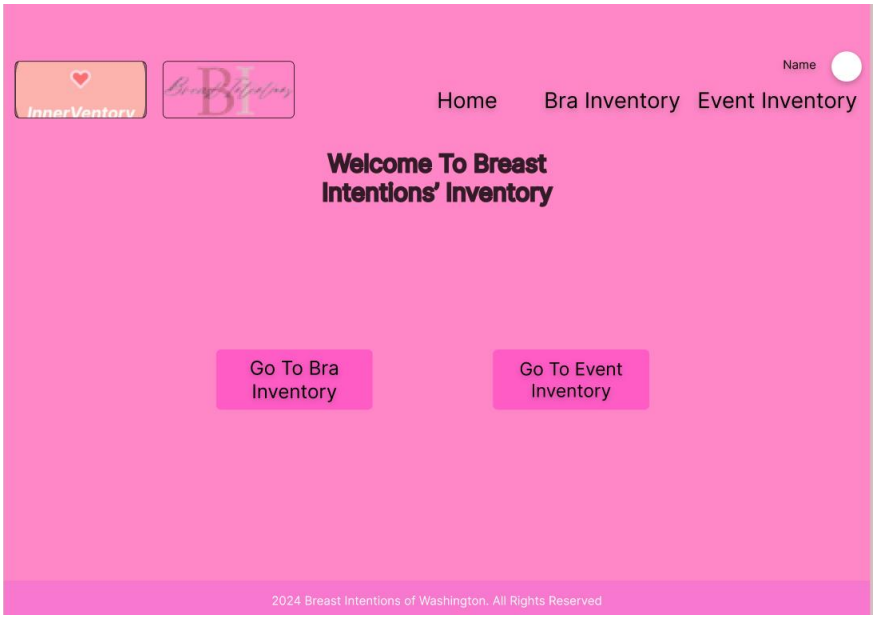

Figure 7: Bra Inventory UI

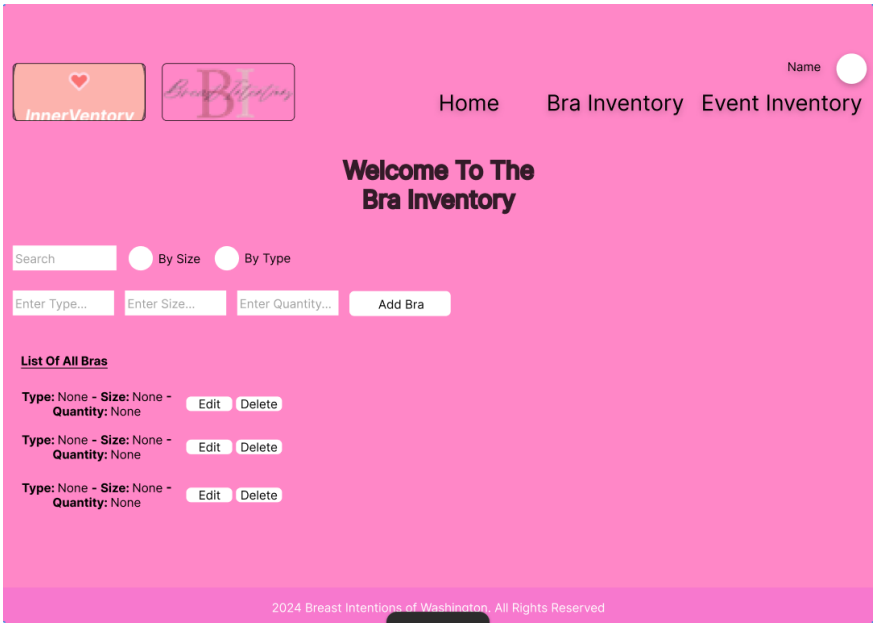

Figure 8: Event Inventory UI