Holistic remedies

Project Proposal

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Abstract

This document outlines the design specifications for our Natural remedies application. The application's primary objective is to provide a comprehensive guide to natural remedies, drawing on age-old practices from cultures around the globe. Users will have easy access to information about alternative and holistic approaches to common health problems, enabling them to make informed choices about their well-being. By offering a wealth of knowledge on natural remedies, our application seeks to promote a more balanced and holistic approach to healthcare, fostering awareness and appreciation of traditional healing practices. Our application will be designed for widespread accessibility, ensuring that individuals can access this valuable resource from anywhere. Our goal is to empower people to make informed decisions about their health and well-being, bridging the gap between modern pharmaceuticals and traditional remedies, and ultimately promoting a healthier and more holistic approach to self-care.

Introduction

Purpose

The purpose of our application is it aims to inform and offer people alternative remedies for common illnesses, in contrast to the conventional modern medicine available today. We aim to educate people about the natural remedies from various cultures around the world, which have been passed down through generations but have been overshadowed by modern medicine.

Intended Audience

This application is intended for use by everyone, regardless of their socioeconomic status. Our goal is to make alternative remedies for common illnesses accessible to everyone. We aim to bridge the gap between traditional wisdom and modern medicine by educating people about natural remedies from diverse cultures worldwide. Our mission is to promote holistic well-being for people from all walks of life, recognizing the value of these time tested remedies that have been passed down from one generation to another in many cultures around the world.

Project Scope

The primary goal of this application is to offer users natural remedies as a viable alternative to modern medicine for common illnesses. When users utilize our system, it will prompt them to describe their symptoms or ailment. Upon entering their illness, the system will present a selection of natural remedies from around the world. Each remedy will include detailed information about its ingredients, origins, and historical usage.

Additionally, users will have access to instructional videos demonstrating how to prepare and use these remedies effectively.

Problem Statement

Problem Definition

The problem we are addressing with this project involves the accessibility of holistic remedies to people who may be either unaware of, or have inaccurate knowledge of these medicines.

Problem Rationale

People who are attempting to find holistic solutions to their medical problems have to do lots of research to find solutions. The internet is full of places where people make false claims, and it can be difficult to distinguish between actual natural remedies and false claims. We hope to give people a place where these remedies can be accurate and we can bridge the gap between natural remedies and people who are seeking them out.

Research

Problem Research

When creating this project we had to pursue two types of research. The first being the problem research. We needed to find natural remedy solutions for the medical

ailments we wanted to cover. We used a variety of online resources to compile the natural remedies we wanted to use.

Technical Research

In order to create this project we also needed to research technologies to implement this website. We did not have any web development experience so we had to use online resources to help with the implementation of this website.

To build our backend web application we used the flask documentation. This provided the background information as well as examples of how to implement a web application using python's flask framework.

To build our front end we used several tutorials as well as documentation. We used the W3schools website to help answer questions about HTML, CSS, and JavaScript. We also watched this tutorial on building a website with these technologies in order to learn how to create this application.

Research On Remedies:

For our application, we conducted extensive research on various remedies for different ailments from countries around the world. We gathered information about the ingredients used in these remedies, delved into the background explaining why they are used, and also included historical context. Here is our findings:

Jamaica

Colds: Sorrel Tea (Jamaica)

Ingredients: Dried sorrel petals, hot water, ginger, cloves, sugar (optional)

Background: Sorrel tea, made from hibiscus flowers (sorrel), is a popular Jamaican remedy for colds and flu. It's rich in vitamin C and can be enjoyed hot or cold. To prepare, steep dried sorrel petals with ginger and cloves, and sweeten with sugar if desired.

History: The tradition of sorrel tea in Jamaica can be traced back to the island's colonial history. African slaves brought their knowledge of the sorrel plant with them, recognizing its medicinal properties. Over time, sorrel tea became a symbol of cultural resilience, blending African herbal knowledge with Caribbean flavors. Today, it remains a cherished part of Jamaican culture, especially during the holiday season.

Stomach Aches: Aloe Vera Gel (Jamaica)

Ingredients: Fresh aloe vera gel

Background: Aloe vera is commonly grown in Jamaica and is used to soothe stomachaches and digestive issues. Simply extract the fresh gel from an aloe vera leaf and consume it in small amounts to alleviate discomfort.

History: Aloe vera's use in Jamaica dates back centuries to the island's indigenous Taino people. They recognized its healing properties and passed down this knowledge to subsequent generations. Early European settlers also embraced aloe vera for its medicinal benefits, making it an integral part of Jamaica's traditional remedies.

Lethargy: Soursop (Graviola) Smoothie (Jamaica)

Ingredients: Soursop (graviola) pulp, coconut milk, honey (optional)

Background: Soursop is a tropical fruit found in Jamaica and is believed to provide an energy boost. Blend soursop pulp with coconut milk to create a creamy and revitalizing smoothie. You can sweeten it with honey if desired.

History: Soursop has deep roots in the Caribbean, with indigenous peoples using it for both its flavor and potential health benefits. Over time, it became a cherished fruit in Jamaican cuisine and a symbol of the region's biodiversity. Today, soursop smoothies are a delicious and natural way to combat lethargy, connecting modern Jamaicans to their cultural and culinary heritage.

Headaches: Fever Grass Tea

Ingredients: Fever grass (lemongrass), hot water, honey (optional)

Background: Fever grass, known as lemongrass in other parts of the world, is commonly used in Jamaica for its potential headache-relieving properties. Steeping the grass in hot water and adding honey for sweetness can create a soothing tea.

History: The use of fever grass in Jamaica for medicinal purposes dates back centuries, with its origins in African and East Indian traditional medicine. It's been embraced in Jamaican culture for its versatility and effectiveness.

BOLIVIA

Colds: Coca Leaf Tea (Bolivia):

Ingredients: Dried coca leaves, hot water

Background: Coca leaves are native to Bolivia and have been traditionally used for their potential to relieve cold symptoms and boost energy. Steep dried coca leaves in hot water to make a soothing tea.

History: Coca leaves have a long history in Bolivia, dating back to the ancient civilizations of the Andes, including the Incas. Indigenous communities in the region have used coca leaves for thousands of years, not only for their potential medicinal properties but also for their role in cultural and religious practices. Coca leaves remain an integral part of Bolivian culture and heritage.

Stomach Aches: Muña Tea (Bolivia):

Ingredients: Muña leaves, hot water

Background: Muña is a medicinal herb found in the Andes region of Bolivia. Bolivians use Muña tea to ease stomachaches and digestive discomfort. Steep Muña leaves in hot water for a soothing herbal infusion.

History: Muña has a rich history in Andean traditional medicine. Indigenous communities in Bolivia and other Andean countries have long relied on Muña for its digestive and medicinal properties. Its use has been passed down through generations, and it remains an important part of Bolivia's cultural and herbal heritage.

Lethargy: Quinoa Energy Bars (Bolivia)

Ingredients: Quinoa, honey, nuts, dried fruits

Background: Quinoa is a staple food in Bolivia and is rich in nutrients and energy-boosting properties. Make quinoa energy bars by mixing cooked quinoa with honey, nuts, and dried fruits for a revitalizing snack.

History: Quinoa has been cultivated in the Andean region, including Bolivia, for over 5,000 years. It was a fundamental crop for pre-Columbian civilizations like the Incas and remains a vital part of Bolivian agriculture and cuisine. Quinoa's nutritional value and adaptability have made it a key component of Bolivian food culture and a symbol of resilience.

Headaches: Eucalyptus Infusion

Ingredients: Eucalyptus leaves, hot water

Background: Eucalyptus leaves are often used in Bolivia to alleviate headaches. The leaves are steeped in hot water to release their aromatic oils, creating a therapeutic infusion.

History: The use of eucalyptus for medicinal purposes in Bolivia is rooted in traditional Andean medicine. The indigenous peoples have long recognized the healing properties of eucalyptus, particularly for respiratory and headache relief.

Armenia

Colds: Armenian Herbal Infusion (Armenia)

Ingredients: Armenian herbal mix (mint, thyme, oregano), hot water, honey (optional)

Background: Armenians have a long history of using herbal infusions to combat colds and flu-like symptoms. They often blend locally available herbs like mint, thyme, and oregano to create soothing and aromatic teas. Honey is sometimes added for sweetness.

History: The use of herbs in Armenian traditional medicine dates back to ancient times. The region's mountainous terrain and diverse flora have contributed to a rich tradition of herbal remedies. Armenian healers and herbalists passed down their knowledge through generations, preserving the use of these herbs for their potential health benefits. Today, herbal infusions continue to be an integral part of Armenian culture and holistic healing practices.

Stomach Aches: Yogurt with Mint (Armenia)

Ingredients: Yogurt, fresh mint leaves, salt

Background: In Armenia, yogurt with fresh mint leaves is a common remedy for stomach aches and indigestion. The probiotics in yogurt and the soothing properties of mint are believed to aid digestion and alleviate discomfort.

History: Yogurt has a long history in Armenian cuisine, with references to its consumption dating back to ancient times. The practice of adding mint for digestive benefits likely developed over centuries of culinary experimentation and the understanding of the soothing properties of mint. This remedy reflects the integration of traditional healing practices into everyday Armenian life.

Lethargy: Armenian Herbal Tonic (Armenia)

Ingredients: Various herbs like rosemary, thyme, sage, hot water, honey (optional)

Background: Armenians prepare herbal tonics using a blend of locally available herbs, including rosemary, thyme, and sage. This aromatic infusion is believed to provide an energy boost and combat lethargy.

History: The use of herbs for vitality and well-being has deep historical roots in Armenia. Throughout the ages, Armenians have relied on the healing properties of indigenous herbs to maintain health and combat fatigue. These herbal tonics represent a tradition of holistic wellness and continue to be appreciated in modern Armenian culture.

Headaches: Lavender Tea

Ingredients: Lavender flowers, hot water

Background: In Armenia, lavender tea is often used for its potential to relieve headaches. The soothing aroma and relaxing properties of lavender are believed to be beneficial.

History: The use of lavender in Armenian traditional medicine dates back to ancient times. It is valued for its calming and therapeutic effects, and its use has been passed down through generations.

Japan

Colds: Wasabi Nasal Steam (Japan)

Ingredients: Fresh wasabi paste, hot water

Background: Japanese culture has a long history of using wasabi for its potential health benefits. The practice of inhaling steam infused with fresh wasabi paste to relieve cold symptoms and clear nasal passages is rooted in traditional Japanese medicine.

History: Wasabi, derived from the root of the Wasabia japonica plant, has been cultivated in Japan for centuries. It was initially used for its pungent flavor in cuisine, but its potential medicinal properties were also recognized. Wasabi's spicy kick and aromatic compounds are believed to help clear congestion and alleviate cold symptoms. Over time, this remedy has become a part of Japan's cultural heritage.

Stomach Aches: Ginger Chews (Japan)

Ingredients: Ginger chews or candied ginger

Background: Japanese culture often uses ginger to soothe nausea and stomach aches. Ginger chews or candied ginger are convenient and effective for soothing stomach discomfort.

History: Ginger has a significant presence in Japanese cuisine and traditional medicine. It was introduced to Japan over a thousand years ago and has since been valued for its potential health benefits. Ginger chews, in particular, offer a tasty and portable way to harness ginger's digestive properties, making them a popular remedy in Japan.

Lethargy: Matcha Green Tea (Japan)

Ingredients: Matcha green tea powder, hot water

Background: Japanese culture embraces matcha green tea for its energy-boosting properties. Preparing and enjoying a cup of matcha tea is a cherished ritual in Japan.

History: Matcha has a history dating back to China's Tang Dynasty but was refined and elevated to an art form in Japan during the Japanese tea ceremony (chanoyu) in the 16th century. Matcha is rich in caffeine and antioxidants, providing a sustained energy boost. It has deep cultural significance in Japan and is considered a symbol of mindfulness and tranquility.

Headaches: Green Tea Compress

Ingredients: Green tea leaves, hot water, cloth

Background: In Japan, a compress made from green tea leaves is commonly applied to the forehead to soothe headaches. The antioxidants and calming properties of green tea are believed to be effective.

History: The therapeutic use of green tea in Japan extends back centuries, with its origins in traditional Chinese medicine. The Japanese have long revered green tea for its health benefits, including headache relief.

India

Colds: Turmeric Milk (India:

Ingredients: Turmeric powder, milk, honey

Background: Turmeric has been a staple in Indian Ayurvedic medicine for centuries. Turmeric milk, or "Golden Milk," is known for its anti-inflammatory properties and its potential to alleviate cold symptoms and boost overall well-being.

History: Turmeric (Curcuma longa) has been used in India for over 4,000 years, dating back to the Vedic period. It has deep cultural and religious significance and is an integral part of Ayurvedic practices. Turmeric milk has been a traditional remedy in India, particularly during the monsoon season when colds are common. The combination of turmeric, milk, and honey is believed to provide comfort and relief from various ailments.

Stomach Aches: Peppermint Oil (India)

Ingredients: Peppermint essential oil, carrier oil (e.g., coconut oil)

Background: In Indian culture, peppermint oil is often used to soothe stomach aches and indigestion. Mixing a few drops of peppermint essential oil with a carrier oil and gently massaging it onto the abdomen is believed to provide relief.

History: Peppermint (Mentha × piperita) has a long history of medicinal use in India, where it is known for its cooling and digestive properties. Its use can be traced back to ancient texts like the Charaka Samhita, a foundational Ayurvedic text. Peppermint oil has been used for its potential to alleviate stomach discomfort and improve digestion.

Lethargy: Ashwagandha Tea (India)

Ingredients: Ashwagandha root or powder, hot water

Background: Ayurveda in India incorporates ashwagandha as an adaptogenic herb that may combat lethargy. Brewing ashwagandha tea is a traditional way to potentially increase energy levels.

History: Ashwagandha (Withania somnifera) has been used for thousands of years in Ayurvedic medicine, making it one of the oldest known medicinal herbs in India. It is considered an adaptogen, which means it helps the body adapt to stress and promotes overall well-being. Ashwagandha's historical use in India reflects its importance in traditional healing practices.

Headaches: Brahmi Oil Massage

Ingredients: Brahmi oil, base oil (like coconut or sesame oil)

Background: Brahmi oil, often diluted with a base oil, is used in India for scalp massages to relieve headaches. Brahmi is known for its calming and stress-relieving properties.

History: Brahmi has been used in Ayurvedic medicine for centuries, primarily for its benefits in improving memory and reducing stress. Its application for headache relief is well-known in traditional Indian healing practices.

Related work

"Making databases, apps more efficient."

The concept of improving database and app efficiency described in this article is highly relevant to the development of our application. Efficient data retrieval and transmission are crucial for delivering a seamless user experience. By implementing optimization techniques like compressing database packets or using efficient data transmission protocols, the app can reduce latency and ensure faster retrieval of information. This can enhance the app's performance, responsiveness, and overall user satisfaction. Furthermore, improving the app's efficiency can help minimize data usage, making it more accessible to users who may have limited or expensive data plans.

“The Traditional Medicine and Modern Medicine from Natural Products”

This article emphasizes the significant role of natural products and traditional medicine in modern drug discovery and medical practices which is crucial to the improvements of our application. This article outlines the historical use of plants, animals, and other natural resources for medicinal purposes, tracing back at least 60,000 years. This article also emphasizes the importance and significant impact of natural products in the creation and advancement of important medications. This article also points out the potential for future discoveries in the largely unexplored realm of natural products, suggesting that their chemical diversity could lead to novel drug compounds. The article also proposes that combining traditional medical knowledge with modern scientific techniques could lead to significant advancements in healthcare and new drug development. This information was crucial to us because knowing this information we were able to have peace of mind knowing we were making an application that will help and inform people of natural remedies they can use to cure/help with the ailments.

User view

1. The system shall display the homepage once the user logs in.

   Description: After the user enters the link in the browser and logs in the homepage should be displayed.

   Precondition: The user should have the website link to the page.

   Postcondition: After entering the page and logging in the homepage has to be displayed.

2. . The system shall ask the user if they are sick or not.

   Description: Once the user logs in the system will ask the user if they are sick or not with a yes or no question.

   Preconditioned: The user must be logged into the website.

   Postcondition: After the user makes a selection the system has to display another page.

3. The system shall display a list of possible illnesses

   Description: Once the user declares that he isn't feeling well the system will display a list of possible ailments they can have.

   Precondition: The user selected yes to feeling ill.

   Postcondition: System provides a list of possible ailments.

4. The system shall provide different options of natural remedies

   Description: Once the user selects what ailment they have the system shall display different natural remedies from different parts of the world to treat that ailment.

   Precondition: The user must select what ailment they have.

   Postcondition: The system will display different remedies to treat set ailment.

5. The system shall provide the ingredients on how to make the remedy as well as provide a YouTube link to watch a video on how to make it.

   Description: Once the user selects a remedy that they like to see the systems shall

display the ingredients on how to make the natural remedy as well as provide a brief history on the ailment and its origins. The system will also provide a YouTube link on how to make the natural remedy.

Precondition: The user must select what remedy ingredient they like to see.

Postcondition: The systems display information on set remedy as well as provide a video link

UML diagrams

Use case diagram

Upon entering the home page, users are prompted to log in. Once logged in, the system shall check if the user is experiencing any health issues. If the user indicates they are unwell, the system shall offer a list of common ailments. Upon selecting an ailment, the system shall provide a curated list of natural remedies, complete with preparation instructions and historical origins. Additionally, users have the option to access a YouTube link for a visual guide on creating the chosen natural remedy.

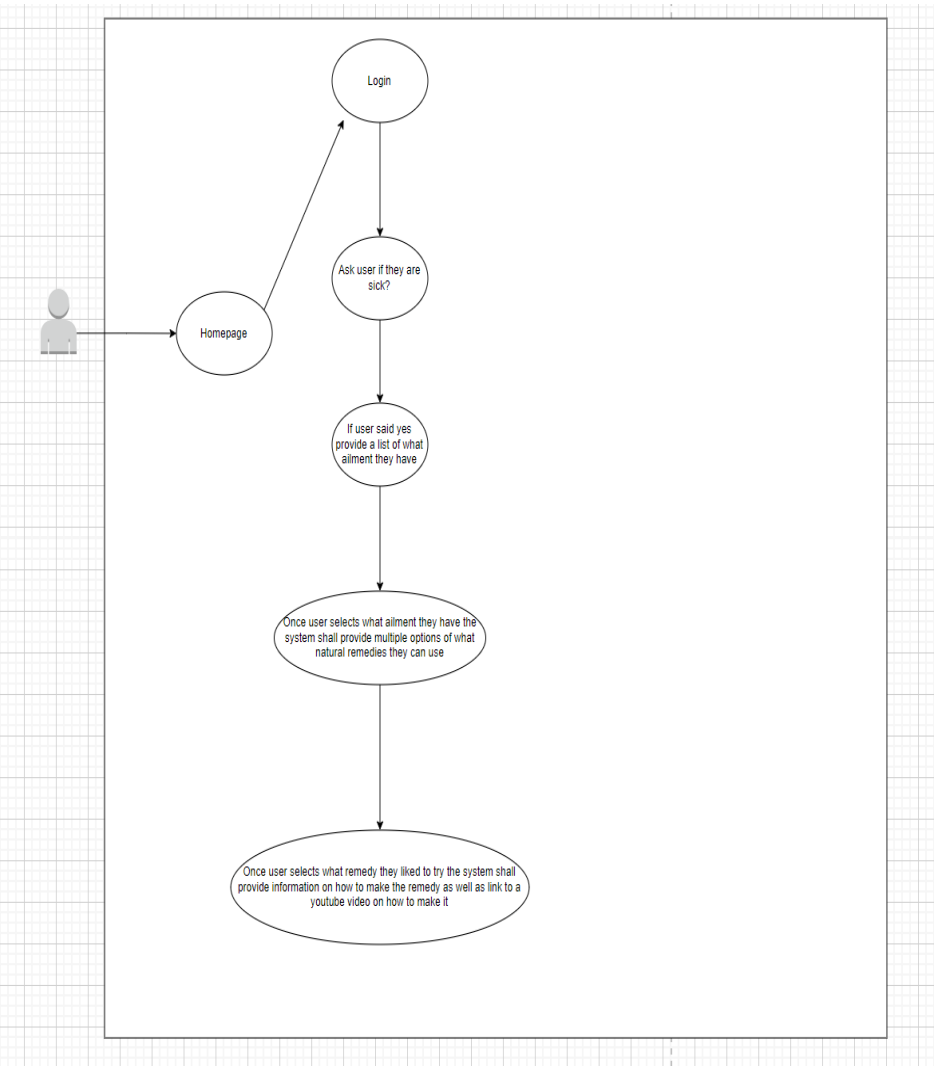


Figure 1

Sequence Diagram

Upon opening our webpage, the user will be prompted to login. Once logged in all subsequent requests to our back-end will be accompanied by calls to our authentication database. When our user makes a GET request to a certain back-end resource (remedy document) the back end will send its response in JSON format to the client to be rendered.

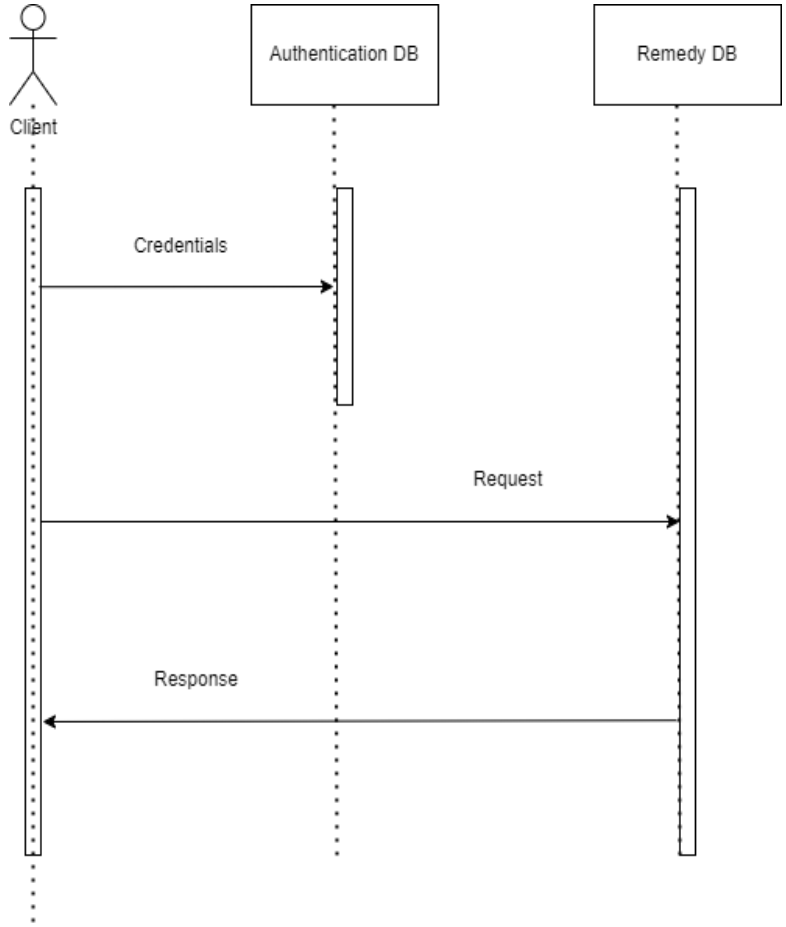


Figure 2

Activity Diagram

The following diagram gives a detailed view of a user's interaction with our website.

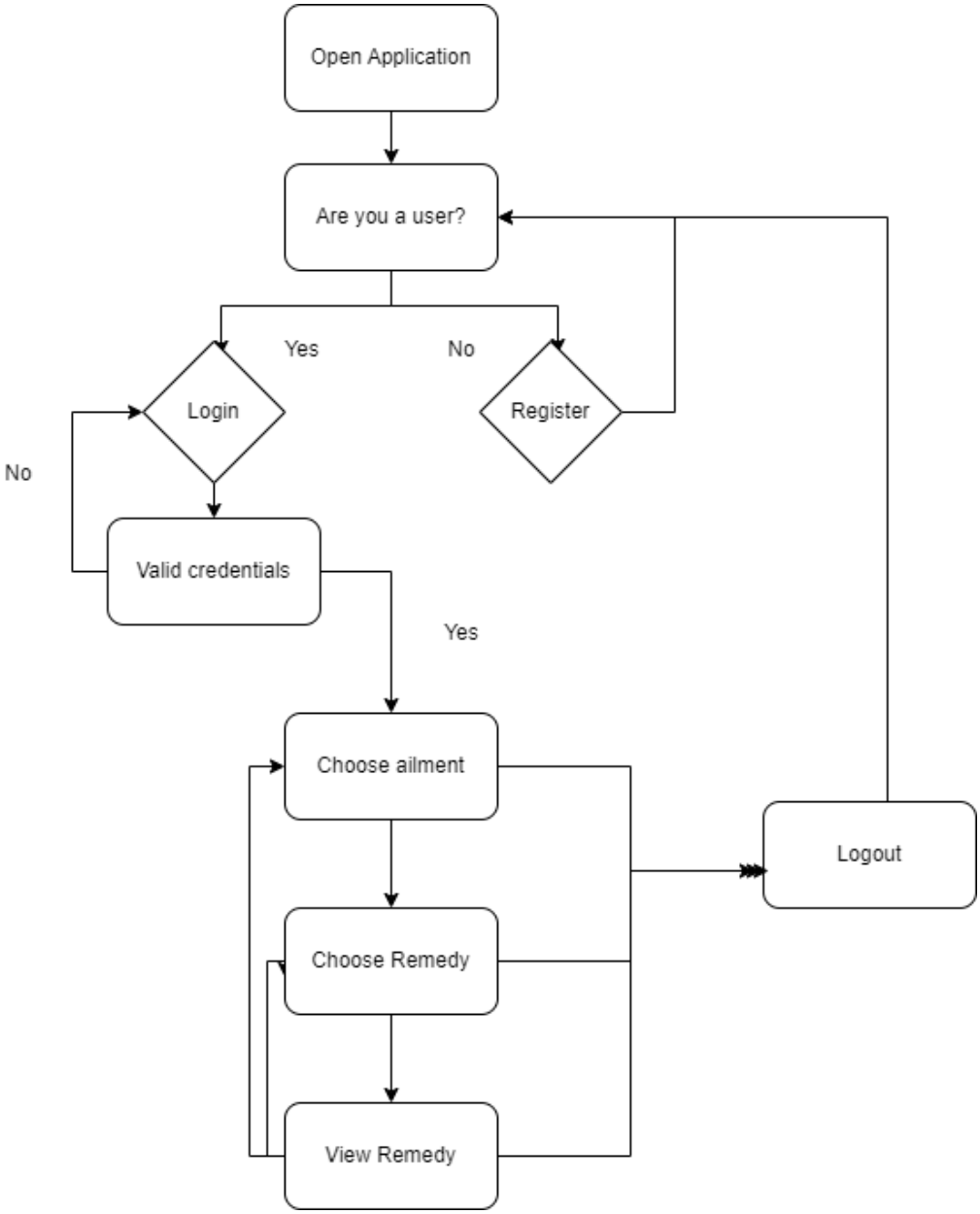


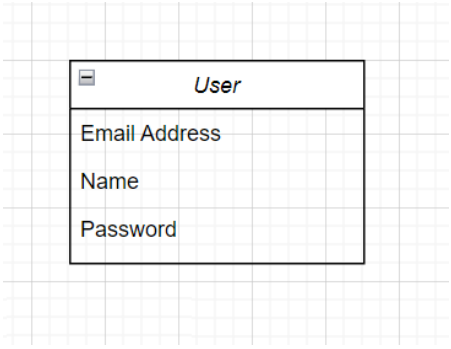
Figure 3

Database Schema

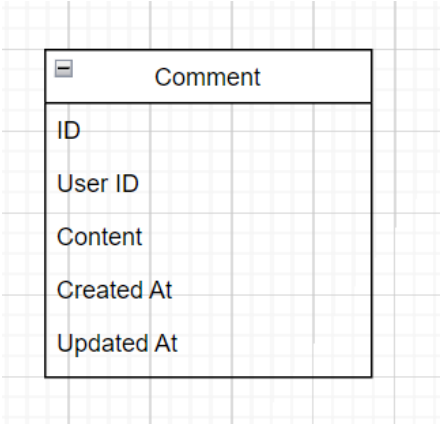
We have two databases that our project uses, these databases each only have one table so there are no relationships that a more complex database would contain.

For this reason we are not using an entity relationship diagram, however we do want to display the overall structure of these databases.

Our first database shown below is hosted by AWS Cognito and we did not implement it. However the following table is the overall structure of the records in the database. It is used for user authentication and contains the following information.



The next database schema we did implement ourselves. It uses MySQL to create our discussion board functionality. We wrote our MySQL scripts and used MySQLWorkbench to populate the database that we are hosting in an Amazon RDS instance. The following screenshot shows the database structure.



Technical Stack

Development Environment

The development environment outlines the primary systems that our program was written and tested on.

- Operating System: Microsoft Windows 10 Home
- Required Packages: Flask
- Programming Languages: Python 3.2, HTML, CSS, JavaScript
- IDE: Visual Studio Code

Operational Environment

Since our goal is to make our website accessible the operational environment is very accessible as long as the user has a connection to the internet.

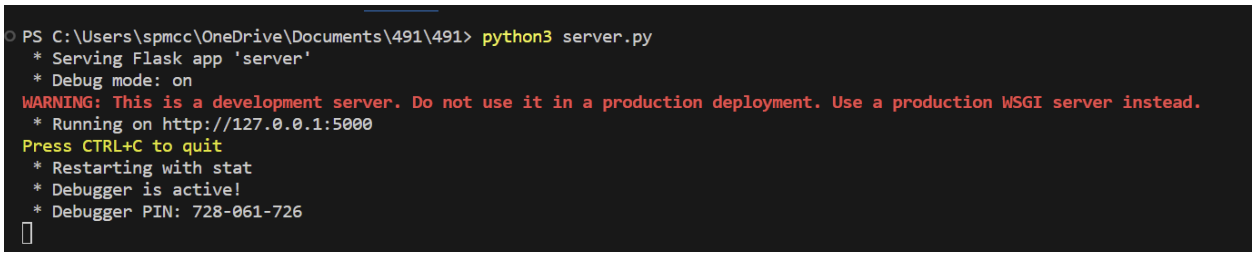
- Operating System: Windows, Mac, and Linux are all supported.
- Browser: Any modern web browser that has access to the internet will be able to access our website.
- Internet Connection: Mandatory.

Host Environment

In order to deploy our project we must host our application to make it accessible to our users. Our Back-end database is hosted on Amazon RDS. Our authentication database and functionality are being hosted on Amazon Cognito. The back-end flask application, and front end HTML pages are currently being hosted locally. The following steps will describe the current local host environment.

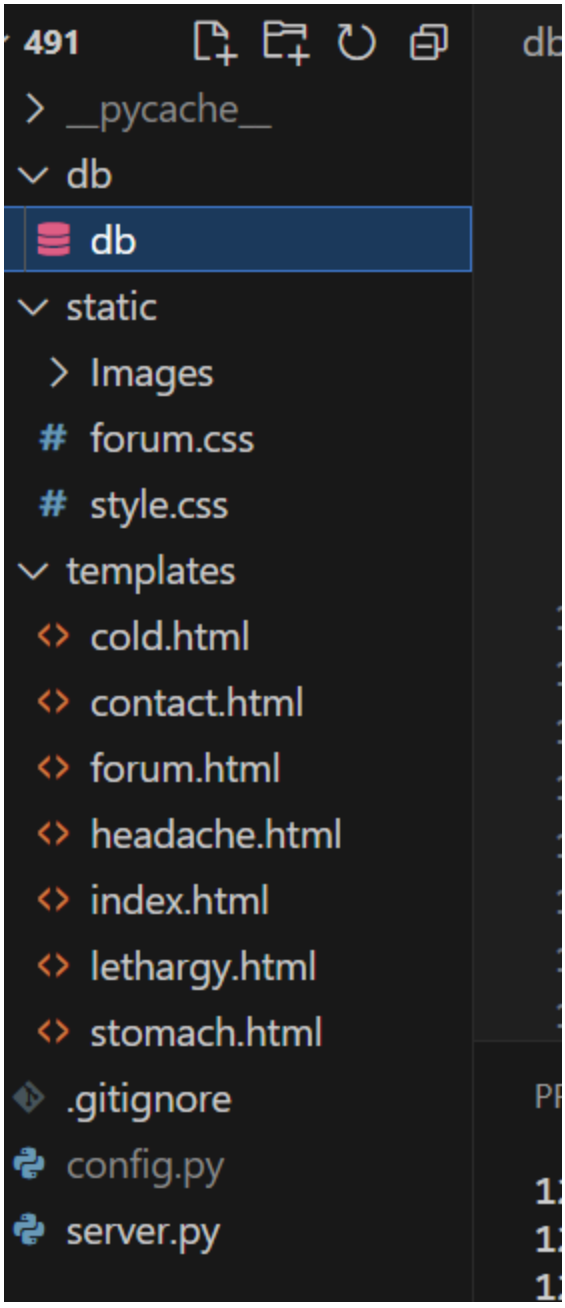
- Install python 3
- Install dependencies using pip (Flask, requests, SQLAlchemy, datetime, jwt)

- In the directory containing the server.py file type the command python3 server.py.
- Once started go to http://localhost:5000 and enjoy our website.



Project Structure

Below we will display the directory structure of our application. In flask applications static file including Javascript and CSS files must be placed in a separate directory named static. We have also placed our images in a separate image directory. Our main application runs from the server.py file, this is our back end server that handles routing, authentication, and database connections. Our HTML files that are sent to the client are stored in the template directory. Our database connection string is stored in our config.py file. This file is being ignored by GitHub using our gitignore file, in order to protect the security of our database. We will provide the actual connection string to you so you can connect to our database if you want to run this project locally.

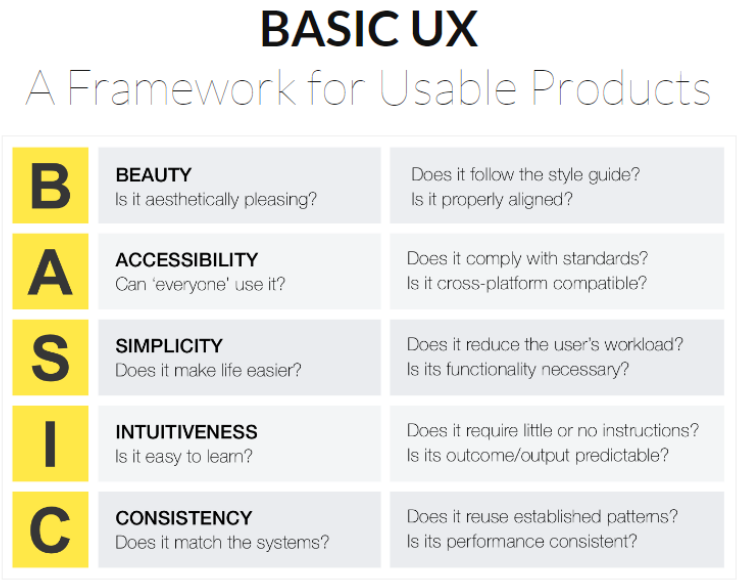


UX Framework

The framework I want to utilize is the Basic Model. This model uses five principles to assist the UX design process beauty, accessibility, simplicity, intuitiveness, and consistency. https://basicux.com/

I chose the Basic Model for my UX framework because I felt it embodied what I had in mind for my user's experience. I want to create a simple and accessible website where

everyone can easily participate and enjoy the functionality of the website. I felt that the Basic UX framework would be a good way to create such an environment.



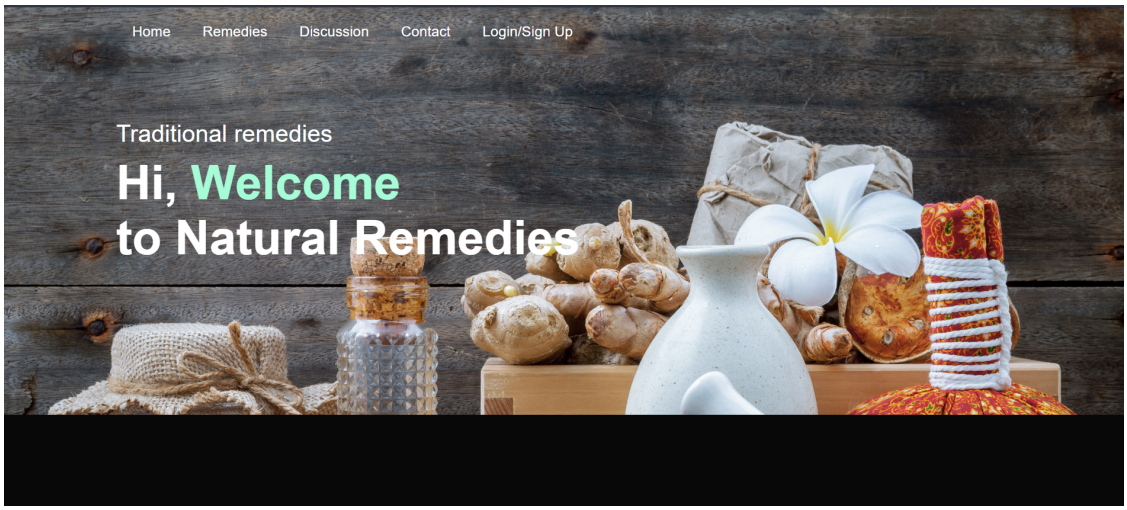
Final UI

When implementing our final UI we took the BASIC principles to heart. The below screenshots show our final UI. As you can see we kept the the format simple and intuitive, specifically in the placement of our nav-bar and buttons. This design allows for a simple user flow and intuitive feel when someone uses our website.

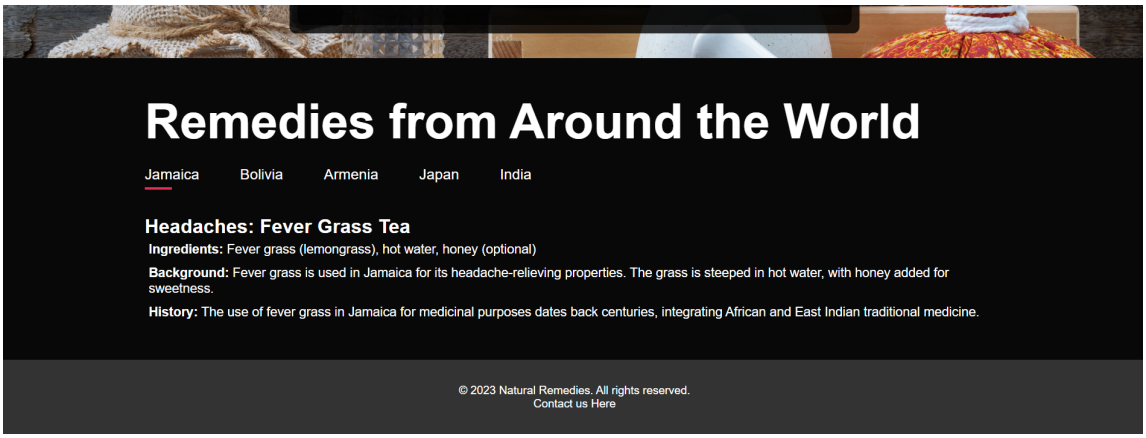
We decided to keep our pages consistent as well, this would allow for users to feel comfortable navigating to different pages, and still feel like they are on the same website. The idea behind BASIC UI design is to allow users to feel comfortable when using our application without sacrificing our aesthetic goals. We feel our intuitive and sleek design accomplishes this goal and stays true to the BASIC UI framework.

Functionality

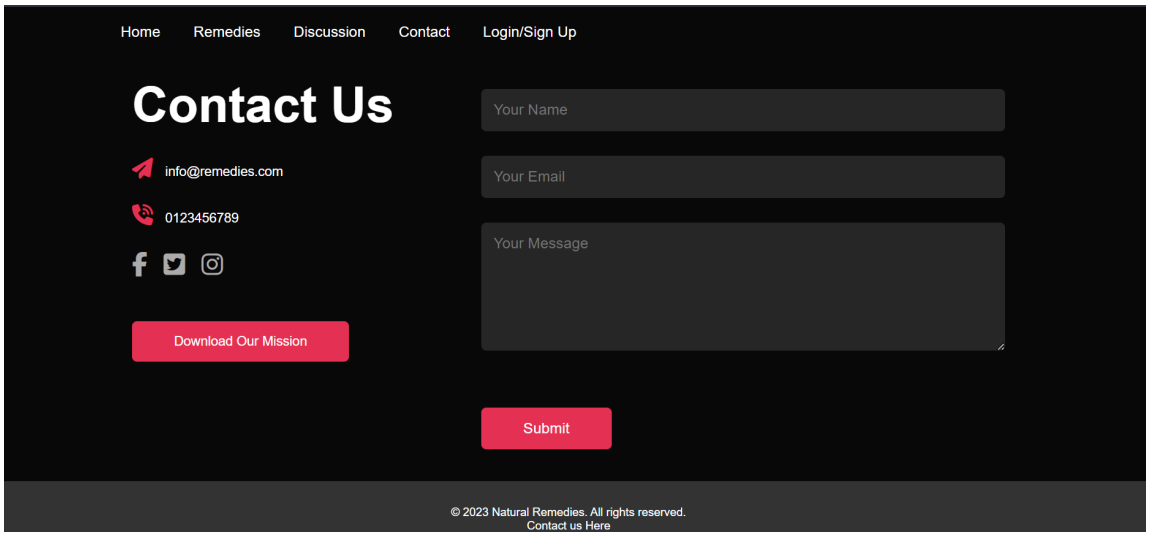
In our application a user is routed to the homepage of our application. The homepage contains information about our project as well as allows the user to select the action they wish to perform. All portions of are site are reachable through the navigation bar at the top of the screen, and each page has the same navigation bar at the top.



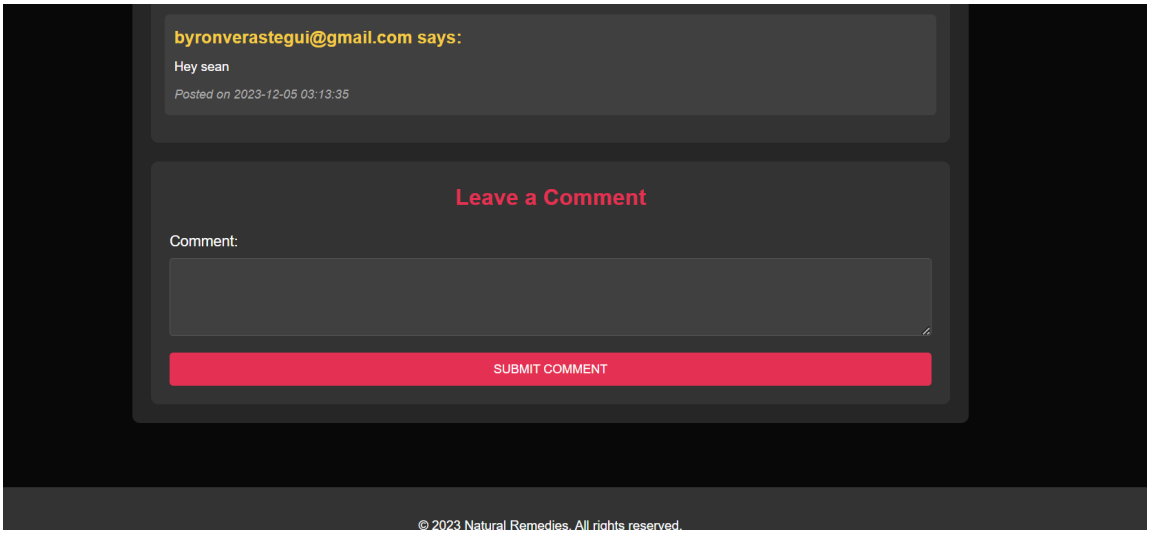
The following image shows an example remedy page. The user is able to select the country of origin they wish to find a remedy from. Each remedy page has the same countries to choose from and has the remedies associated with each country.



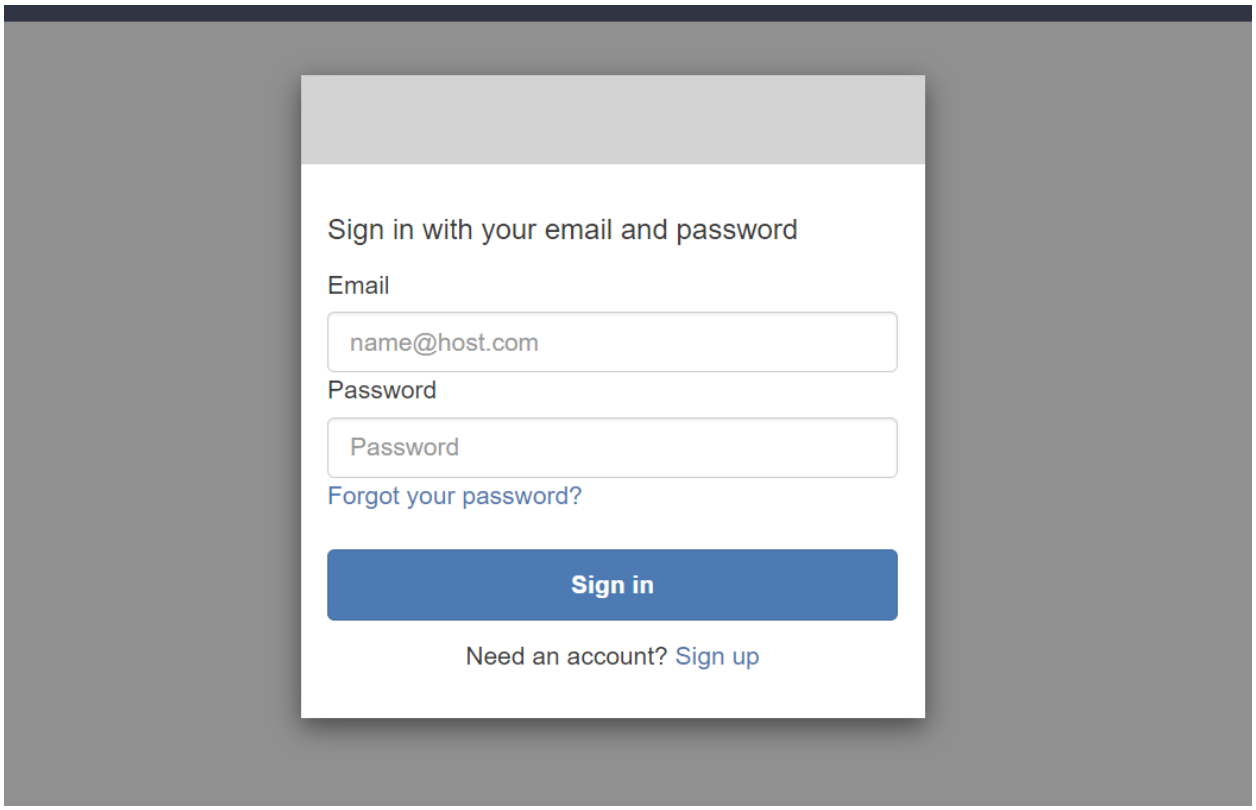
Our contact us page allows our users to reach out to us and provide feedback. The user must enter a valid email and fill out the form entirely. We have a google sheet that records all of our user feedback. We simply use an AJAX call to send a Google macro to our sheet and record our user feedback in the cloud. This is the google doc that our site populates. https://docs.google.com/spreadsheets/d/1Ixa-VpTFb3pza200ips9s92HoTyXIi14Y7IJWHgCLfY/edit#gid=0



The next image shows our discussion board. Users are able to post comments in our discussion board and communicate with each other. If a user is not signed in and they try to post to the discussion board they are redirected to our login page. Once logged in the user can post a comment. The username is populated by the email address our users use to create an account with us. This was done to allow for accountability in our discussion forum, we wanted it to be a safe space for our users to communicate, and anonymity can compromise that value.

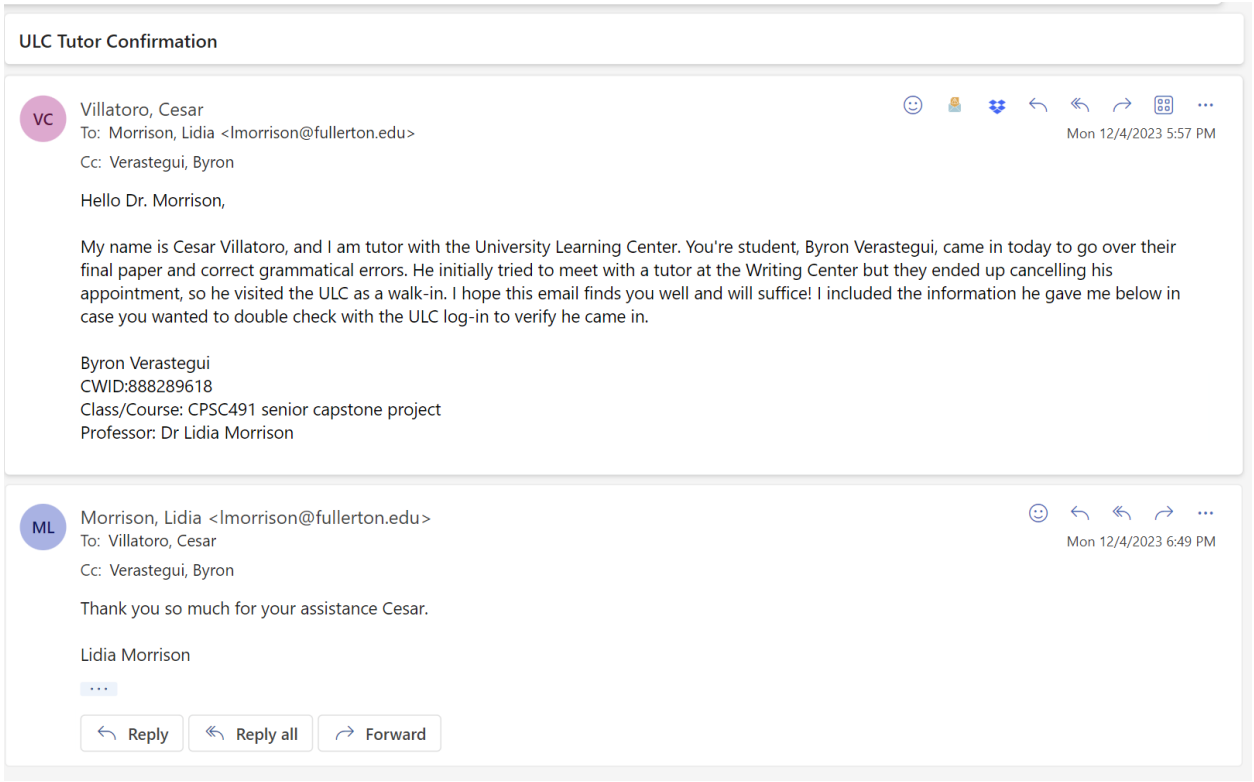


The following screenshot shows our login page. This page is used to allow users to login to our application. It is a webpage that is hosted and generated by Amazon Cognito. While we had to configure the AWS module we did not write the UI code for this specific page. We did have to write our authentication functionality in our back-end however. See our server.py file for implementation details.



Writing Center

The below screenshot displays our proof of having this document edited by the learning center.



ULC Tutor Confirmation

VC

Villatoro, Cesar
To: Morrison, Lidia <lmorrison@fullerton.edu>
Cc: Verastegui, Byron

Mon 12/4/2023 5:57 PM

Hello Dr. Morrison,

My name is Cesar Villatoro, and I am tutor with the University Learning Center. You're student, Byron Verastegui, came in today to go over their final paper and correct grammatical errors. He initially tried to meet with a tutor at the Writing Center but they ended up cancelling his appointment, so he visited the ULC as a walk-in. I hope this email finds you well and will suffice! I included the information he gave me below in case you wanted to double check with the ULC log-in to verify he came in.

Byron Verastegui
CWID:888289618
Class/Course: CPSC491 senior capstone project
Professor: Dr Lidia Morrison

ML

Morrison, Lidia <lmorrison@fullerton.edu>
To: Villatoro, Cesar
Cc: Verastegui, Byron

Mon 12/4/2023 6:49 PM

Thank you so much for your assistance Cesar.

Lidia Morrison

...

Reply | Reply all | Forward

References:

Source #1:

Yuan H, Ma Q, Ye L, Piao G. The Traditional Medicine and Modern Medicine from Natural Products. Molecules. 2016 Apr 29;21(5):559. doi: 10.3390/molecules21050559. PMID: 27136524; PMCID: PMC6273146.

Source #2:

CSU. (n.d.). https://csu-fullerton.primo.exlibrisgroup.com/discovery/fulldisplay?docid=cdi_proquest_reports_215976693&context=PC&vid=01CALS_FUL%3A01CALS_FUL&lang=en&search_scope=CentralIndex&adaptor=Primo+Central&tab=CentralIndex&query=any%2Ccontains%2C%3A+Making+databases%2C%C2%A0apps%C2%A0more+efficient%2C+Musthaler%2C+Linda%2C+Network+World%2C+2007&offset=0

Source #3

Shalabh Aggarwal, Flask Framework Cookbook: Enhance your Flask skills with advanced techniques and build dynamic, responsive web applications , Packt Publishing, 2023.

Source #4

Ben Piper; David Clinton, "Authentication and Authorization—AWS Identity and Access Management," in AWS Certified Solutions Architect Study Guide with 900 Practice Test Questions: Associate (SAA-C03) Exam , Wiley, 2023, pp.175-192.