Llama Lingo Software Requirements Specification Document

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1.0 Introduction

1.1 Goals and Objectives

This software project application aims to utilize knowledge of artificial domain experts, contained within ChatGPT or Llama2. The approach is "bottom-up" with an agile process model, where the application process starts with extreme analytics and fits them to a topic, the overall application development will be broken down into small iterations as we learn more about specific requirements.

For this to be achieved, our software project application will consist of artificial narrow intelligence products (ANI), that will be absorbed/compiled and coordinated. Each ANI will essentially be an expert on its specialty knowledge within a singular topic (for example, one ANI will know about specific gaming statistics, where the overall topic is gaming). The specialty knowledge will be originally translated and gathered into data structures, such as graphical data generated by ChatGPT/Llama2. The analyzed data will be stored and the application, filled with the collected analyzed data of a specific topic (ANI), will be able to answer inquiries (questions and concerns) from the end users about the topic for educational purposes.

The overall goal of the application is to help end users explore topics through the domain experts' thought processes, a pedagogical tool that can be beneficial for a wide range of people and fields.

1.2 Statement of Scope

Users

The overall contributors of the application are the administrators, engineers, academy, end users, neural net, and domain experts. The main users of the application's end product will be the administrators and end users, administrators can be seen as a subset of end users. The administrators will have complete access and control over the entire application's content, with special privileges to the content that not anyone can access. While end users will be able to acquire the information the application has to offer over a specific topic.

Inputs

Administrators will be able to log in, access, and log out of their administration login panel, perform CRUD operations on their administration login (add, view, delete, and/or update administrator information), be able to perform CRUD operations within the application's storage account (add, view, and/or update administrative information within the database storage account), perform CRUD operations within the application's parsed object dataset (add, view, delete, and/or update data information on specified topic), perform CRUD operations on branding and customization (add, view, delete, and/or update visuals of selected pages).

The end users will be able to input inquiries (questions or concerns) related to the application's specific topic, into the application's prompt.

Processing Functionality

The entire software project application will be utilized by all users through a web application. Administrative information will be created and then stored within the application's database storage account, using Azure Cloud. All data information (ANI) related to the application's specific topic will also be stored in the storage account. All information within the storage account will be utilized by the application to allow administrators to perform their CRUD operations when necessary and to supply end users with valuable information about the application's specific topic that they can learn from.

Outputs

- The software project's website application with a user-friendly interface that administrators and end users can interact with:
    - UI for the administrators to access their admin panel
    - UI for the administrator's admin panel (administrator menu options)
- The end user's answer to their inquiry:
    - A question prompt, easily accessible to the user, where they can input their question/concern for the application to answer/analyze.

1.3 Software Context

Artificial intelligence (AI) has become an increasingly popular field of study within computer science. Now, we see many businesses and developers utilizing AI technology to create a wide array of different program applications and tools. So why not create a software application, with analyzed information from ChatGPT/Llama 2, notorious AI applications, that can be used for educational purposes? Many people such as students, employees, hobbyists, or even just general users could benefit from using an application that is trained to be an expert within a specific topic. Imagine an employee starting a new position being given all the information they need to know to be successful in their career or an environmentalist being able to get facts and updates about the latest trends in climate change, all by asking a simple question through an AI-developed application. This is what the foundation of Llama Lingo is, a pedagogical tool that can benefit those interested in a specific topic.

1.4 Major Constraints

- There is a time constraint. The client has many ideas for the project's overall functionality, however with only 8-9 months, it is only realistic that not every proposed function will be able to be constructed.
    - Since we are taking an agile approach with our project development, a portion of our time will be spent learning about the integration of our significant technologies through practice problems given by our client.
- There is a limit on team members. Tying into the time constraint, not all proposed functions will most likely be constructed since there are only 4 members on our team.
- Administrative information will need to be protected from unauthorized users.
- The system must support user independence, privacy, and accessibility.
    - Users can easily understand user interfaces.
    - Users can navigate the system without assistance from other users.

2.0 Usage Scenario

2.1 User Profiles

- **Administration (admin) - Full Control:**
    - **Role:** Administrative staff or system administrators.
    - **Responsibilities:** Administrators can perform tasks such as system configuration, user management, content management, and coordination of artificial domain experts. They have the highest level of access and control within the system.
- **End User (user) - Read Only:**
    - **Role:** General users, students, employees, or hobbyists.
    - **Responsibilities:** Interacting with the system for learning, training, or exploration purposes. They may use functions provided by the system to receive insights and get their questions answered by the artificial domain experts.

2.2 User Stories

- **Administrator:**
    - As an administrator, I want to be able to manage the system. I want to have access to CRUD (Create, Read, Update, Delete) functionalities for parsed objects, locations, brands, and users within the system. I want to contribute to the system by adding knowledge and expertise about a topic.
- **End User:**
    - As an end user, I want to explore various topics using the system's artificial domain experts to gain deeper insights and knowledge.

2.3 Special Usage Considerations

- **Different Devices or Screen Sizes:**
  Some users may be using devices with small screens or limited display capabilities. Ensure that the user interface remains functional and legible on various screen sizes and devices.

- **User Requires Assistance with Accessibility:**
  If a user requires accessibility features due to visual, auditory, or motor impairments, the system may need adjustable fonts, screen reader compatibility, and keyboard shortcuts.

3.0 Data Model and Description

3.1 Data Description

3.1.1 Data Objects

- EndUser
  - Represents the overall user.
  - Able to access our application.
- Administrator
  - Represents the administrator.
  - Provide initial topic data that will be given to ChatGPT/Llama2 to analyze.
  - Receive analyzed topic data provided by ChatGPT/Llama2 and store/modify within the SSMS/Azure database.
  - Able to access restricted functionalities
    - Can modify the dataset.
    - Can modify the branding/customization of the application website (Blazor).
    - Can log in or out of the application.
    - Can modify administration information.
    - Can modify information related to the database storage account.

- Blazor/Web Application “Llama Lingo”
  - Represents the overall website application UI.
    - From a webpage on a web browser, Blazor allows all users to view the contents of the project. Views are limited based on the user accessing it.
      - Regular end users will only be able to:
        - Input their questions for our domain expert and receive a response (EndUserQuestion, EndUserSubmission).
      - Admin end users will be able to have full access to the application’s functionality (Administrator, EndUserAdministration, EndUserLogin).

- EndUserQuestion
  - Represents the questions that our user asks to our domain expert.
  - Contains a string holding the question.
  - Can be parsed by the domain expert.
- EndUserSubmission
  - Represents the user UI for asking questions.
  - The user may input a string to ask our domain expert.
  - The resulting question is sent to our domain expert; the answer is received and sent to the user.
- EndUserAdministration
  - Represents the user UI for restricted functionality. Only accessible through admin login (EndUserLogin).
  - The user may modify the dataset.
  - The user may rebrand the website.
  - The user may log out of their admin account, thereby being forwarded to EndUserSubmission.
- EndUserLogin
  - Represents the user UI for admin login.
  - The user may input a username and password.
  - The user will be able to see the admin panel.
- TopicData
  - Represents the data that our domain expert will use to answer our users' questions.
  - Stored in an Azure database.
- SSMS/Azure
  - Represents the database where our data is stored.
  - Holds admin login information.
  - Holds topic data.
- Computer
  - Represents the user's computer.
  - Can display our application to the user.
- Web Browser
  - Represents the user's web browser.
  - Can load our application's web page.
  - Can display our webpage to the computer screen.
- ChatGPT/Llama2
  - Will analyze initial topic data provided by an administrator.
  - Once initial topic data is analyzed, it will be provided to the administrator for them to store within the project's database, SSMS/Azure.

3.1.2 Relationships

Class Name: EndUser

Superclasses:

Subclasses: Administrator, EndUserSubmission, EndUserQuestion

Responsibilities:

- Will be able to access the Blazor UI application through a computer and web browser/web page.
- Will be able to input their questions into a question prompt.
- Will be able to receive an answer based on their inputted question.
- When full access is granted (the end user is an administrator and has successfully logged in), they will have full administrator capabilities.

Collaborators:

- EndUserSubmission
- EndUserQuestion
- Blazor
- Computer
- Web Browser
- Administrator (full access)
- EndUserLogin (administrator)
- EndUserAdministration (full access)
- TopicData (administrator)
- SSMS/Azure (administrator)

Class Name: Administrator

Superclasses: EndUser

Subclasses: AdminAccount, EndUserLogin, EndUserAdministration

Responsibilities:

- Will have complete control over the project’s entire functionality.
- Will be able to perform CRUD operations on topic data (including the parsed object dataset (POD)) within the SQL Server Management System (SSMS).
- Will be able to perform CRUD operations for administrator information in Microsoft Azure, the database storage account.
- Will be able to perform CRUD operations on the branding/customization of the project.
- Will be able to access the Blazor UI application through a computer and web browser/web page.
- Will be able to log into or log out of the project application.
- Will be able to use ChatGPT/Llama2 to analyze information regarding the topic data.

Collaborators:

- Computer
- Web browser
- Blazor
- SSMS/Azure
- ChatGPT/Llama2
- TopicData

- AdminAccount
- EndUser
- EndUserLogin
- EndUserAdministration

Class Name: EndUserQuestion

Superclasses: EndUser

Subclasses: EndUserSubmission

Responsibilities:

- Contains a string holding the end user’s question.
- Can be parsed by the domain expert.

Collaborators:

- EndUser
- EndUserSubmission
- Blazor
- SSMS/Azure
- Computer
- Web Browser

Class Name: EndUserSubmission

Superclasses: EndUserQuestion, EndUser

Subclasses: SSMS/Azure, Blazor

Responsibilities:

- Used by the end user to submit their question to the application.
- Takes the end user's input from the question prompt.
- Request data for the end user (stored in SSMS/Azure) related to their submitted question.
- Recieve data for the end user (answer, reasoning output).
- Print the end user’s data (answer, reasoning output) through Blazor to the end user’s browser/web page.

Collaborators:

- EndUser
- EndUserQuestion
- SSMS/Azure
- Blazor
- Web Browser
- Computer

Class Name: TopicData

Superclasses: Administrator, ChatGPT/Llama2

Subclasses: SSMS/Azure

Responsibilities:

- Contains information related to the project’s main topic.
- Will be analyzed by ChatGPT/Llama2.
- Put into SSMS/Azure by an administrator.
- Will be used to help analyze a result for end user’s data (questions).

Collaborators:

- Administrator
- ChatGPT/Llama2
- SSMS/Azure
- EndUserSubmission

Class Name: SSMS/Azure

Superclasses: TopicData

Subclasses: AdminAccount

Responsibilities:

- Stores all administrator information.
- Stores all database material.
- Stores all topic data analyzed by ChatGPT/Llama2 (including the parsed object dataset).
- Will contribute to providing the topic data necessary for the application to

analyze the end user’s answer to the question.

Collaborators:

- TopicData
- AdminAccount
- EndUserLogin
- Administrator
- ChatGPT/Llama2
- Blazor
- EndUserSubmission

Class Name: Computer

Superclasses:

Subclasses: Web Browser, Blazor

Responsibilities:

- Digital device that allows users to access a web browser to open the project application on a web page.
- Allows project functionality to be displayed for users to see.

Collaborators (Main):

- Web Browser
- Blazor
- SSMS/Azure

- Administrator
- End User

Class Name: Web Browser

Superclasses: Computer

Subclasses: Blazor

Responsibilities:

- Will allow the users to access the Blazor UI application via a webpage.
- Will allow the Blazor UI application and its functionality to be viewed by all users.

Collaborators (Main):

- Blazor
- Computer
- EndUser
- Administrator
- EndUserQuestion
- EndUserSubmission
- EndUserLogin

Class Name: Blazor

Superclasses: Web Browser, Computer

Subclasses: EndUserSubmission, EndUserLogin, EndUserAdministration

Responsibilities:

- Will provide the overall user interface for all users.
- Will be accessible via a web page on a browser.
- Allow admin end users to log in or out.
- Allow admins to view their admin panel and perform any CRUD operations.
- Will allow regular end users the ability to input questions, get their questions analyzed, and receive their printed correlating answers.

Collaborators:

- Computer
- Web Browser
- EndUserQuestion
- EndUserSubmission
- EndUserLogin
- EndUser
- Administrator
- SSMS/Azure

Class Name: ChatGPT/Llama2

Superclasses: TopicData

Subclasses: SSMS/Azure

Responsibilities:

- Receives initial topic data given by the administrator.
- Analyze the topic data given.
- Sends/prints the newly analyzed data to the administrator for them to input into the project database (SSMS/Azure).

Collaborators:

- Administrator
- SSMS/Azure
- TopicData

Class Name: AdminAccount

Superclasses: Administrator, SSMS/Azure

Subclasses:

Responsibilities:

- Will contain all the administrator information.
- Only accessible through administrative approval.
- Can be manipulated by administrators.
- Provides information necessary to allow administrators access to the project application.

Collaborators:

- Administrator

● SSMS/Azure

Class Name: EndUserAdminsitration
Superclasses: Administrator, EndUserLogin
Subclasses: TopicData, AdminAccount
Responsibilities: ● Allow admin end users to conduct any restricted functionality by providing their admin information (username, password). ● Allow admin end users to view/navigate the admin panel in the project application. ● Allow admin to perform CRUD operations on parsed object dataset. ● Allow admin to perform CRUD operations on the branding/customization of the application website. ● Allow admin to perform CRUD on database material.
Collaborators: ● Computer ● Web browser ● Blazor ● SSMS/Azure ● ChatGPT/Llama2 ● TopicData ● AdminAccount ● EndUser

- EndUserLogin

Class Name: EndUserLogin

Superclasses: Administrator

Subclasses: EndUserAdministration

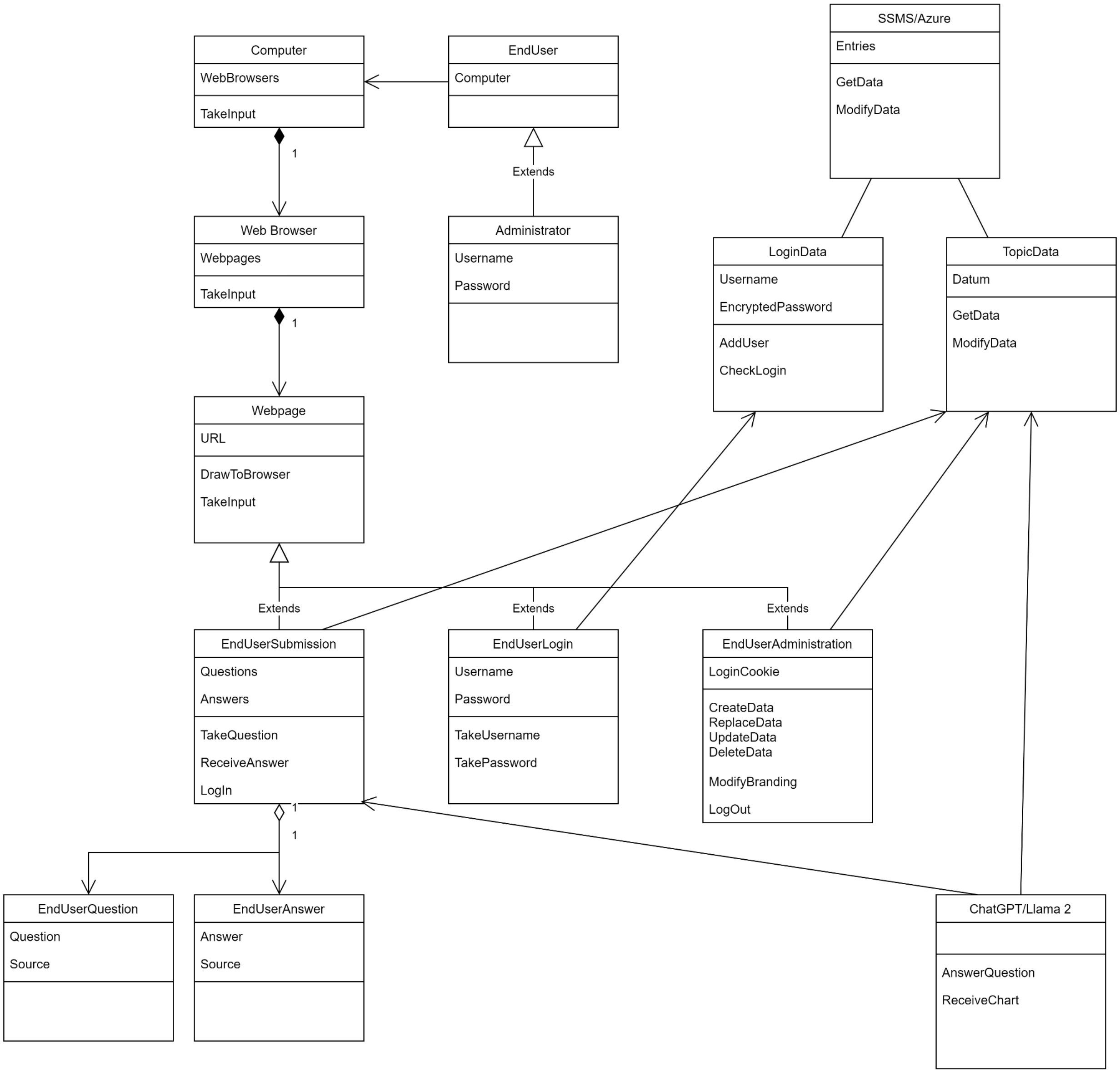
Responsibilities:

- Allows admin end users to log into the Blazor UI project application, using their admin credentials (username, password).
- Provides the process of verifying if the inputted admin info is accurate with the database.

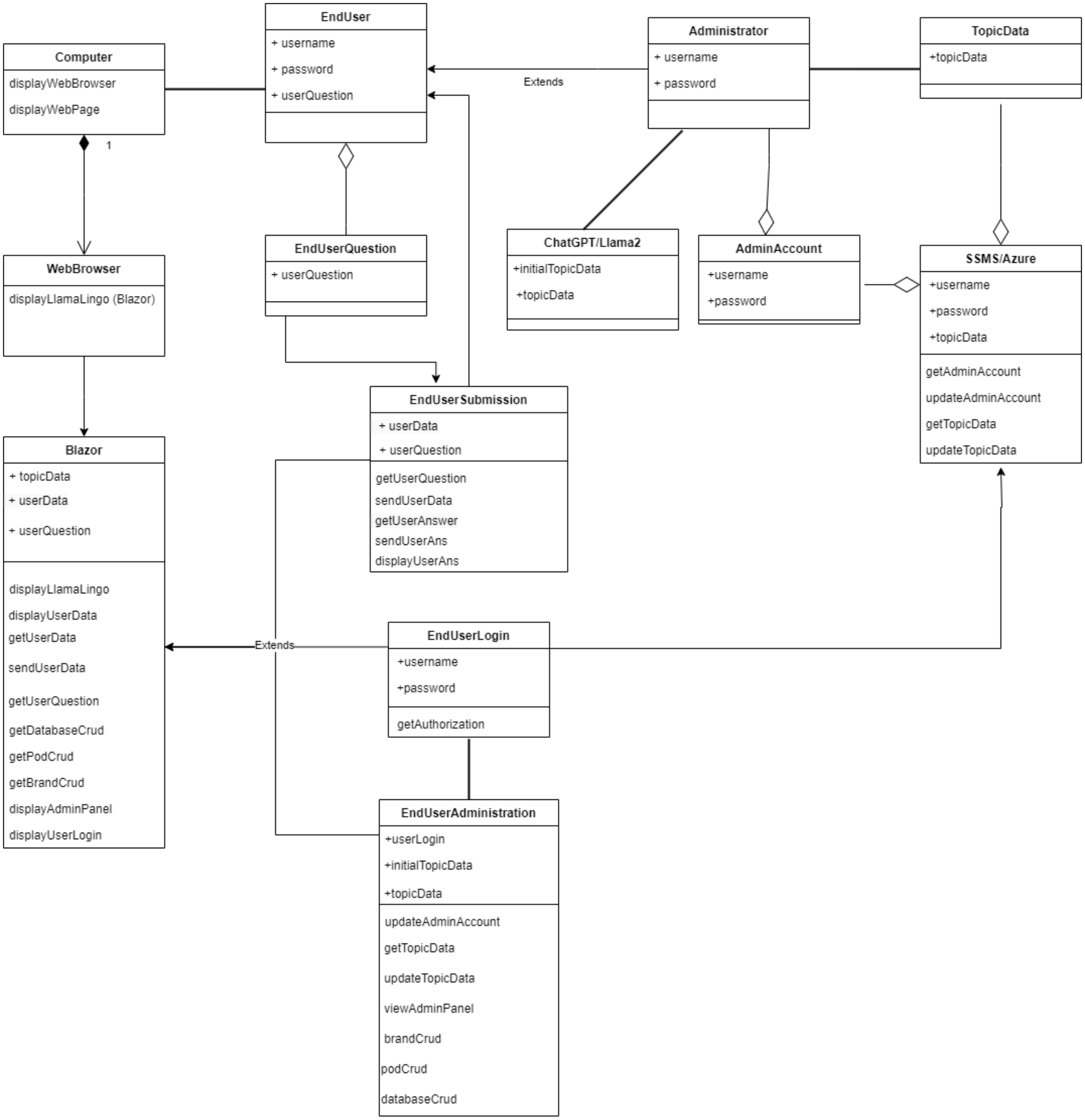
Collaborators:

- Administrator
- AdminAccount
- SSMS/Azure
- Blazor
- Computer
- Webpage
- EndUserAdministration

3.1.3 Complete Data Model



Updated data model



3.1.4 Data Dictionary

Note: All referenced data dictionary information (specifically the Attributes/Methods information) is suggestive. These demonstrate the functionality and data objects associated with our project and aren't the actual names of said functions/data objects being implemented. This is mainly because we are following an agile process, so what we know as of now may very well change, and for simplicity purposes.

End User - Overall users of the project application	
Attribute / Method	**Definition**
username	If the end user is an administrator, their corresponding username to access full application functionality.
password	If the end user is an administrator, their corresponding password to access full application functionality.
endUserQuestion	String that is entered in the application question prompt, a question the user has regarding the main topic of the project. Needed for the EndUserSubmission process.

Administrator - End user subclass, has full access to project application	
Attribute / Method	**Definition**
username	Corresponding username to access full application functionality.
password	Corresponding password to access full application functionality.

Computer - Digital device for displaying the project application	
Attribute / Method	**Definition**
displayWebBrowser	Will display the web browser on computer monitor
displayWebPage	Will display the web page containing the Blazor UI application (LlamaLingo) to the user's browser, with corresponding URL/.

WebBrowser - Allows the project application to be displayed on a web page	
Attribute / Method	**Definition**
displayLlamaLingo (Blazor)	Allows the project application to be displayed on a web page, with a corresponding URL.

Blazor - The overall website application	
Attribute / Method	**Definition**
displayLlamaLingo	Allows the project application to be displayed on a web page, with a corresponding URL.

getUserLogin	Process to receive the login information only for administrators.
displayUserLogin	Display the admin user login page
displayAdminPanel	Once an admin is logged in, their admin panel will be displayed.
getBrandCrud	If an admin performs any branding/customization CRUD, the effect will be received and implemented.
getPodCrud	If an admin performs any parsed object dataset CRUD, the effect will be received and implemented.
getDatabaseCrud	If an admin performs any database-related CRUD, the effect will be received and implemented.
getUserQuestion	Process of receiving the end user's question, the data type is a string value.
sendUserData	Process of sending the user's question to get analyzed.
getUserAns	Process of receiving the analyzed answer to the user's question (reasoning output).
displayUserAns	The process of displaying the user's answer to them.

<table>
<tr><td colspan="2"><b>EndUserQuestion -</b> The questions that our user will ask</td></tr>
<tr><th>Attribute / Method</th><th>Definition</th></tr>
<tr><td>userQuestion</td><td>The end user's question regarding the application's main topic is the data type is a string value.</td></tr>
</table>

<table>
<tr><td colspan="2"><b>EndUserSubmission -</b> The user UI for asking questions</td></tr>
<tr><th>Attribute / Method</th><th>Definition</th></tr>
<tr><td>getUserQuestion</td><td>Process of getting the submitted user question.</td></tr>
<tr><td>sendUserData</td><td>Process of sending the user question to get analyzed by the system.</td></tr>
<tr><td>getUserAns</td><td>Process of receiving the analyzed answer to the user's question (reasoning output).</td></tr>
<tr><td>sendUserAns</td><td>Process of sending the analyzed user answer back to the project application (Blazor).</td></tr>
<tr><td>displayUserAns</td><td>The process of displaying the user's answer to them on the project application page, through Blazor.</td></tr>
</table>

EndUserAdministration - The user UI for restricted functionality.	
Attribute / Method	**Definition**
updateAdminAccount	The process of performing CRUD on any admin accounts.
initialTopicData	The initial information regarding the project's main topic
getTopicData	The process of administrators putting topic data into the database.
updateTopicData	The process of performing CRUD on any topic data.
viewAdminPanel	Admin can view the administrative panel within the Blazor application.
userLogin	The login information is only for administrators.
brandCrud	Process of performing branding/customization CRUD operations.
podCrud	Process of performing parsed object dataset CRUD operations.
databaseCrud	Process of performing CRUD operations of database material.

EndUserLogin - The user UI for admin login.	
Attribute / Method	**Definition**
username	Corresponding username for administrators to access full application functionality.
password	Corresponding password for administrators to access full application functionality.
getAuthorization	The process of the application verifying if the inputted admin info is accurate with the database.

TopicData - The data that will be used to answer our users' questions.	
Attribute / Method	**Definition**
topicData	The analyzed topic data is analyzed by ChatGPT/Llama2 and is transferred to the database. Composed of graphical data.

SSMS/Azure - The database of the project application	
Attribute / Method	**Definition**
username	Corresponding username for administrators to access full application functionality.
password	Corresponding password for administrators to access full application functionality.
topicData	The analyzed topic data that is inputted by an administrator.
getAdminAccount	The validation process for when an administrator wants to access the project application.
updateAdminAccount	The process of performing CRUD on any admin accounts.
getTopicData	The process of getting topic data relevant to an end user's questions, and administrators putting topic data into the database.
updateTopicData	The process of performing CRUD on any topic data.

ChatGPT/Llama2 - Gives administrators analyzed topic data	
Attribute / Method	**Definition**
initialTopicData	The initial information regarding the project's main topic, given by the administrators to analyze.
topicData	The analyzed topic data that will be transferred and stored in the SSMS/Azure database.

4.0 Functional Model and Description

4.1 Description for Functions

4.1.1 Admin Menu Login Process

4.1.2 Actors

- Administrator
- Application UI
- Application storage Account

4.1.3 Preconditions

Storage Account (Database): Database for the application that contains all ANI specialty data information and encrypted administrative information.

Application Website UI: The application's general website user interface. What all users will see and be able to interact with its content. End users can ask questions on the displayed prompt and receive answers on their browser screen.

Application Admin UI: User interface for the administration menu panel

4.1.4 Triggers

- The administrator has navigated and accessed the application.
- The administrator clicks on an icon that directs them to the administrative login page
- The administrator has their information within the application's storage account and must be previously logged out of the admin panel.

4.1.5 Scenario Description

1. Administrator has navigated and accessed the application
2. Administrator is already logged out of system
3. Administrator clicks on the appropriate icon to enter the admin panel login page,
4. Administrator enters their valid information and then have access to the admin menu for available CRUD operations

4.1.6 Post Conditions

Meets acceptance criteria: The administrator must be able to log into the admin panel.
Security: The application should encrypt/hide all administrative data entered

4.1.6 Exceptions

- The administrator is unable to log in because they did not input the correct login information, the inputted information could not be found in the database under the administrator table
  - Application will display error message of failed login attempt and will ask user to try again

4.1.8 *Admin Menu Logout Process*

4.1.9 Actors

- Administrator
- Application UI

- Application storage Account

4.1.10 Preconditions

Storage Account (Database): Database for the application that contains all ANI specialty data information and encrypted administrative information.

Application Website UI: The application's general website user interface. What all users will see and be able to interact with its content. End user's can ask questions on the displayed prompt and receive answers on their browser screen.

Application Admin UI: User interface for the administration menu panel

4.1.11 Triggers

- The administrator has navigated and accessed the application.
- The administrator clicks on an icon that directs them to log out of the administrative panel

4.1.12 Scenario Description

1. Administrator has navigated and accessed the application
2. Administrator is already logged into the system
3. Administrator clicks on the appropriate icon to direct them to log out of the administrative panel
4. Administrator is logged out of the system and is directed back to the application's main website UI

4.1.13 Post Conditions

Meets acceptance criteria: The administrator must be able to log out of the admin panel.

4.1.14 Exceptions

- The administrator is unable to log out of the admin panel correctly due to possible functional error
    - Application will display error message

4.1.15 *Admin Menu Branding*

4.1.16 Actors

- Administrator
- Application UI

4.1.17 Preconditions

Application Website UI: The application's general website user interface. What all users will see and be able to interact with its content. End users can ask questions on the displayed prompt and receive answers on their browser screen.

Application Admin UI: User interface for the administration menu panel

4.1.18 Triggers

- The administrator has navigated and accessed the application.
- The administrator successfully logged into the admin panel and selects branding option

4.1.19 Scenario Description

1. Administrator has navigated and accessed the application
2. Administrator logs in to the admin panel.
3. Navigates to the branding and customization section.
4. Selects branding options
    a. Logo
    b. Colors
    c. Text
5. Applies the selected branding to the selected pages.

4.1.20 Post Conditions

Meets acceptance criteria: The administrator must be able to select a branding option and apply branding to the application's selected pages.

4.1.21 Exceptions

- The administrator is unable to correctly process branding and customization CRUD due to functional error
    - Application will display error message

4.1.22 *Admin POD CRUD (Parsed Object Dataset)*

4.1.23 Actors

- Administrator
- Application storage Account
- Application UI

4.1.24 Preconditions

Application Website UI: The application's general website user interface. What all users will see and be able to interact with its content. End users can ask questions on the displayed prompt and receive answers on their browser screen.

Application Admin UI: User interface for the administration menu panel

Storage Account (Database): Database for the application that contains all ANI specialty data information and encrypted administrative information.

4.1.25 Triggers

- The administrator has navigated and accessed the application.
- The administrator successfully logged into the admin panel and selects the Parsed Object Dataset management section

4.1.26 Scenario Description

1. Administrator has navigated and accessed the application
2. Administrator logs in to the admin panel.
3. Navigates to the Parsed Object Dataset management section.
4. Selects the desired operation
    a. Create()
    b. Read()
    c. Update()
    d. Delete()
5. Provides necessary input or selects a dataset.
6. The system performs the CRUD operation on the dataset.

4.1.27 Post Conditions

Meets acceptance criteria: The administrator must be able to select the Parsed Object Dataset management section and perform any POD CRUD operations.

4.1.28 Exceptions

- The administrator is unable to correctly process POD CRUD operations due to functional error
    - For all POD CRUD operations, an appropriate error message will be displayed by the application upon functional error

4.1.29 *Admin Location CRUD (Storage Account)*

4.1.30 Actors

- Administrator

- Application storage account
- Application UI

4.1.31 Preconditions

Application Website UI: The application’s general website user interface. What all users will see and be able to interact with its content. End users can ask questions on the displayed prompt and receive answers on their browser screen.

Application Admin UI: User interface for the administration menu panel

Storage Account (Database): Database for the application that contains all ANI specialty data information and encrypted administrative information.

4.1.32 Triggers

- The administrator has navigated and accessed the application.
- The administrator successfully logged into the admin panel and selects the Storage Location management section.

4.1.33 Scenario Description

1. Administrator has navigated and accessed the application
2. Administrator logs in to the admin panel.
3. Navigates to the Storage Location management section.
4. Selects a Storage Location.
5. Selects the desired operation:
    a. Create()
    b. Read()
    c. Update()
    d. Delete()
6. The system performs the chosen CRUD operation on the Storage Location.

4.1.34 Post Conditions

Meets acceptance criteria: The administrator must be able to select the Storage Location management section and perform any of its CRUD operations.

4.1.35 Exceptions

- The administrator is unable to correctly process storage location management CRUD operations due to functional error
    - Application will display error message

4.1.36 *End User Inputs Inquiry*

4.1.37 Actors

- End User
- Application UI

4.1.38 Preconditions

Application Website UI: The application's general website user interface. What all users will see and be able to interact with its content. End users can ask questions on the displayed prompt and receive answers on their browser screen.

4.1.39 Triggers

- The end user has navigated and accessed the application.
- The end user attempts to put their inquiry into the question prompt to submit, displayed on the application UI

4.1.40 Scenario Description

1. End user has navigated and accessed the application
2. The user enters a question/concern they have related to the application's topic, into the question prompt
3. The user submits their question/concern to the application for analysis

4.1.41 Post Conditions

Meets acceptance criteria: The end user must be able to enter and submit their inquiry into the application's question prompt.

4.1.42 Exceptions

- The end user inputs a question/concern unrelated to the application's topic
    - The application will show a message to the user stating that they should base their inquiry around its main topic
    - The application will prompt the user to enter a relevant inquiry once again

4.1.43 *End User Receives Inquire Result*

4.1.44 Actors

- End User
- Application UI

4.1.45 Preconditions

Application Website UI: The application's general website user interface. What all users will see and be able to interact with its content. End users can ask questions on the displayed prompt and receive answers on their browser screen.

4.1.46 Triggers

- The end user has navigated and accessed the application.
- The end user submits their inquiry into the question prompt that is relevant application's topic

4.1.47 Scenario Description

1. End user has navigated and accessed the application
2. The user enters a question/concern they have related to the application's topic, into the question prompt
3. The user submits their question/concern to the application for analysis
4. The application analyzes the end user's prompt
5. The application returns the answer to the end user's inquiry to their browser

4.1.48 Post Conditions

Meets acceptance criteria: The end user must be able to receive an answer to their relevant inquiry. The system must be able to properly analyze an end user's inquiry based on the information stored within its database.

4.1.49 Exceptions

- The application is unable to give a relevant answer to the end user's question/concern because they did not input a question/concern related to the application's topic
    - The application will show a message to the user stating that they should base their inquiry around its main topic
    - The application will prompt the user to enter a relevant inquiry once again

4.2 Software Interface Description

4.2.1 External Machine Interfaces

- Administrators/Engineers personal computers
    - Our Team Members, also known as the administrators and Engineers of this project, will be using their personal computers while developing the complete application.

- WiFi Router
    - When accessing the Blazor UI application, any user must be able to connect to the internet. The Blazor UI application is hosted on a web page via a web browser, so connecting to a router that supplies an internet connection will be most suitable for this project.

4.2.2 External System Interfaces

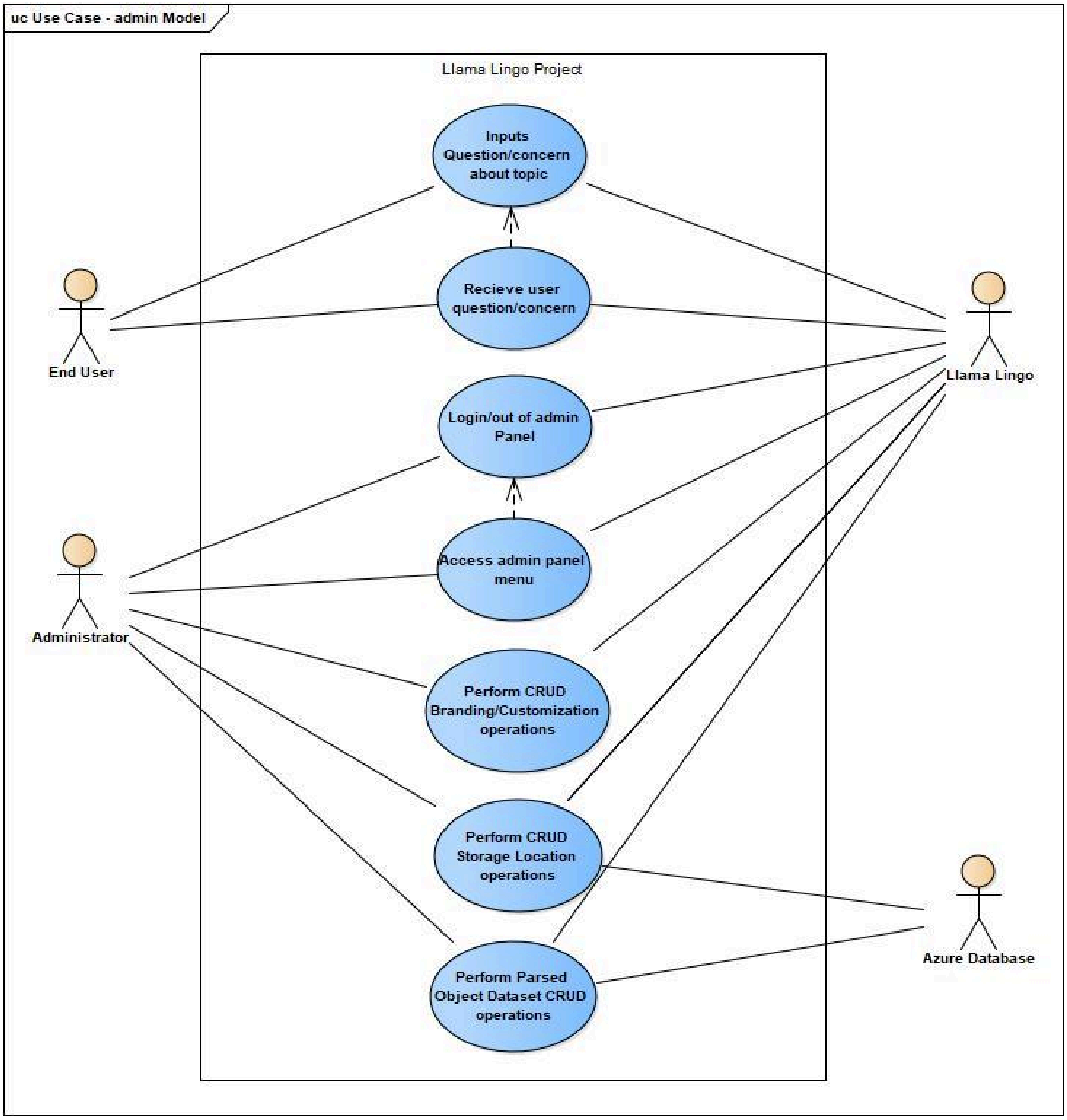
Interfaces to other systems, products, or networks are described.

- SSMS
    - Formally known as Microsoft SQL Server Management Studio. This system will be used as a tool to manage server connections with our Microsoft Azure Database, LlamaLingoDB. Only accessible through server name and password given to administrators, and authorized IP addresses.
- Microsoft Azure
    - The system will allow administrators to manage the project's database system. Only accessible through administrative username and password, and authorized IP addresses.
- Visual Studio & Github
    - Our project's development environment. All application programming code will be stored and manipulated through this development environment. Whenever changes are made, administrators will push such changes to the project's GitHub repository. The GitHub repository is only accessible by administrators.
- Web Browser (Primarily Google Chrome)
    - When the project application is launched through Visual Studio code, the Blazor UI application will appear on a web page within a web browser. The web browser can be any well-known web browser, such as Google Chrome. All users should be able to navigate the Blazor UI application within a web browser with no difficulty.
- Wifi Network
    - For utmost functionality purposes, all users who utilize the Blazor UI application portion of this project should be connected to a WiFi network of some kind, whether it is via a WiFi router or a given personal hotspot.
- ChatGPT/Llama 2
    - Primarily within the initial development process of this project, ChatGPT/Llama 2 will be used to analyze the project's main topic data. We will provide the applications with sample data related to our chosen topic which will then be analyzed thoroughly while also being processed into a graph. The topic data analyzed by these applications will be stored in our project's Microsoft Azure database storage account.

4.2.3 Human Interface

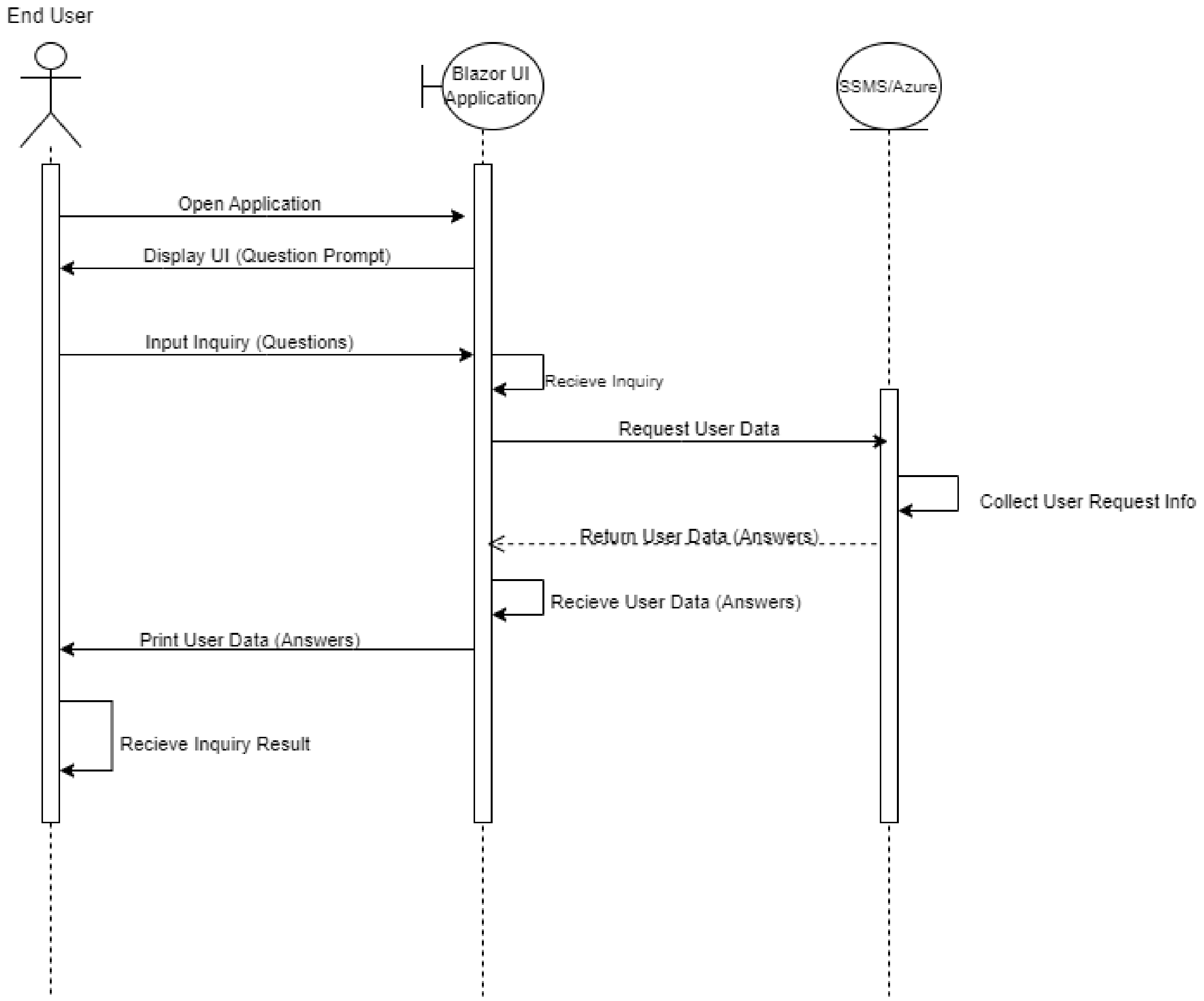
- Blazor UI Application
    - Homepage
        - It consists of a built-in chat feature that allows multiple users on a single server to communicate with each other in real-time. Also showcases all of the offered features of the project application, including all use-case panels for the Admin, Engineer, Domain Expert, End User, Academy, Neural Net, and Interview section.
    - Admin Panel
        - Will contain all the administrative elements of the project application. Will only be accessible through administrative login, where a username and password will need to be provided.
    - Engineer Panel
        - Currently hosts all the UI functionality related to Noun and Verb associations. This will be a panel dedicated to the Engineers of the project development.
    - Domain Expert Panel
        - Will consist of all the needed functionality related to the Domain expert of this project (information gathered and analyzed through ChatGPT/Llama 2).
    - End User Panel
        - Will consist of all the needed functionality related to the end users of this project. End Users will be able to view a question prompt where they can input their questions related to the project's main topic and receive their analyzed response based on their inputted inquiry.
    - Academy Panel
        - Will consist of all the needed functionality related to the academy users of this project. Of such will be the academy menu processes. This will be further expanded as we learn more through our client within our agile process.
    - Neural Net Panel
        - Will consist of all the needed functionality related to the neural net of this project. Of such will be the neural net menu processes, interview questions, and reasoning output.
    - Interview Panel
        - Will consist of all the needed functionality related to the neural net interview process of this project. This will be further expanded as we learn more through our client within our agile process.

4.3 Use Case Diagrams

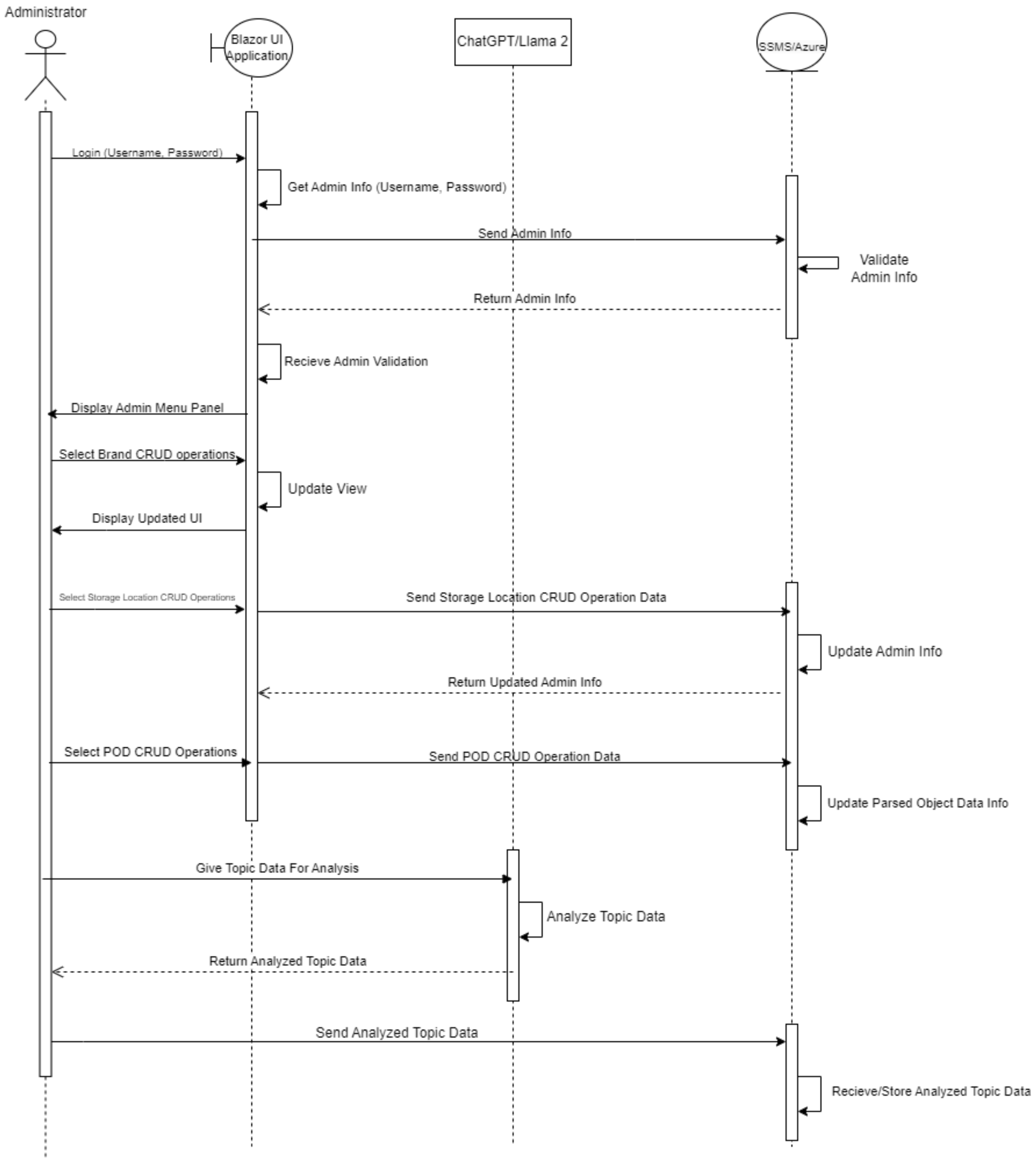

uc Use Case - admin Model
Llama Lingo Project
Inputs Question/concern about topic
Recieve user question/concern
Login/out of admin Panel
Access admin panel menu
Perform CRUD Branding/Customization operations
Perform CRUD Storage Location operations
Perform Parsed Object Dataset CRUD operations
End User
Administrator
Llama Lingo
Azure Database

4.4 Sequence Diagrams

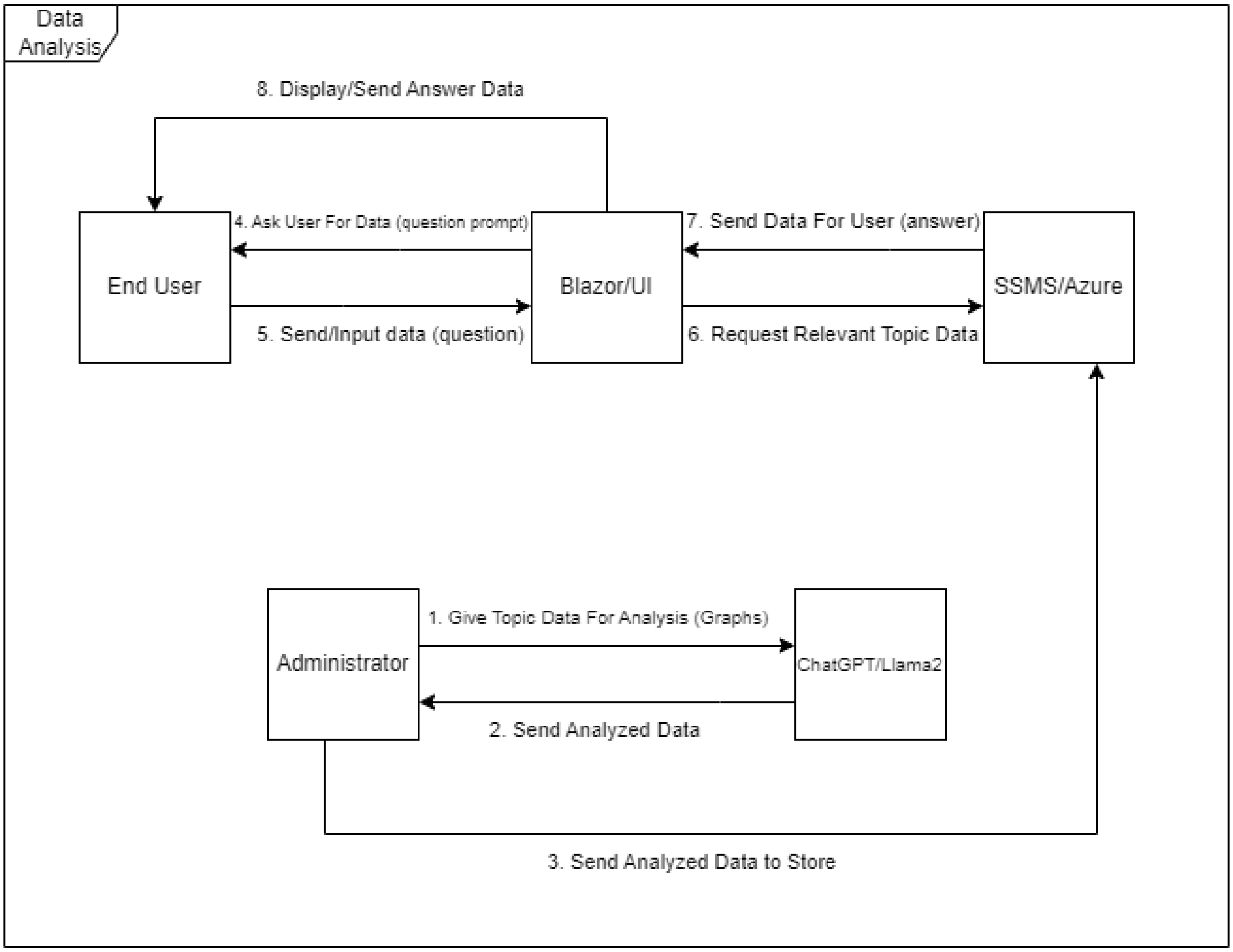
End User Sequence Diagram

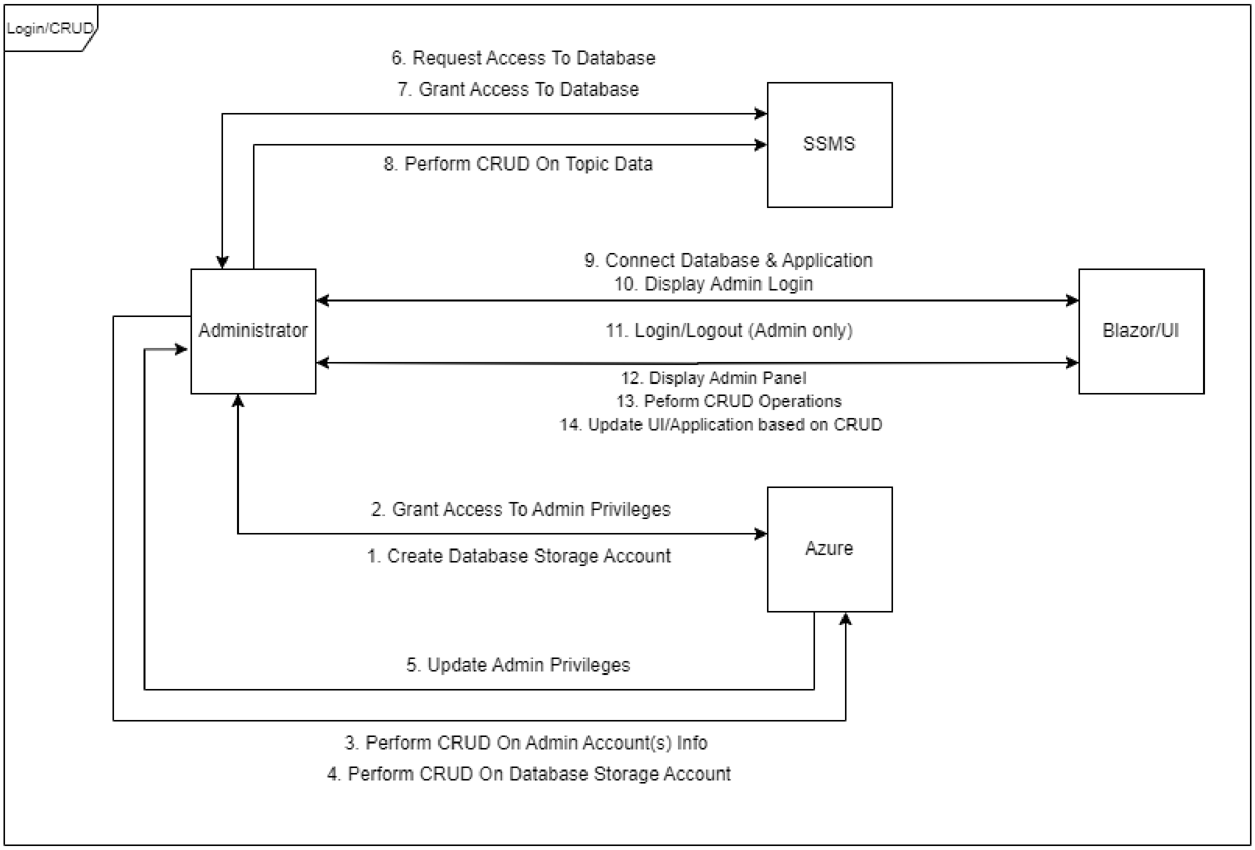

End User
Blazor UI Application
SSMS/Azure
Open Application
Display UI (Question Prompt)
Input Inquiry (Questions)
Recieve Inquiry
Request User Data
Collect User Request Info
Return User Data (Answers)
Recieve User Data (Answers)
Print User Data (Answers)
Recieve Inquiry Result

Administrator Sequence Diagram


Administrator
Blazor UI Application
ChatGPT/Llama 2
SSMS/Azure
Login (Username, Password)
Get Admin Info (Username, Password)
Send Admin Info
Validate Admin Info
Return Admin Info
Recieve Admin Validation
Display Admin Menu Panel
Select Brand CRUD operations
Update View
Display Updated UI
Select Storage Location CRUD Operations
Send Storage Location CRUD Operation Data
Update Admin Info
Return Updated Admin Info
Select POD CRUD Operations
Send POD CRUD Operation Data
Update Parsed Object Data Info
Give Topic Data For Analysis
Analyze Topic Data
Return Analyzed Topic Data
Send Analyzed Topic Data
Recieve/Store Analyzed Topic Data

4.5 Communication Diagrams


Data Analysis
8. Display/Send Answer Data
End User
4. Ask User For Data (question prompt)
Blazor/UI
7. Send Data For User (answer)
SSMS/Azure
5. Send/Input data (question)
6. Request Relevant Topic Data
Administrator
1. Give Topic Data For Analysis (Graphs)
ChatGPT/Llama2
2. Send Analyzed Data
3. Send Analyzed Data to Store


Login/CRUD
6. Request Access To Database
7. Grant Access To Database
SSMS
8. Perform CRUD On Topic Data
9. Connect Database & Application
10. Display Admin Login
Administrator
11. Login/Logout (Admin only)
Blazor/UI
12. Display Admin Panel
13. Peform CRUD Operations
14. Update UI/Application based on CRUD
2. Grant Access To Admin Privileges
Azure
1. Create Database Storage Account
5. Update Admin Privileges
3. Perform CRUD On Admin Account(s) Info
4. Perform CRUD On Database Storage Account

5.0 Behavioral Model and Description

5.1 Description for Software Behavior

5.1.1 Events

- Receive data:
  - The main project may obtain data from the user or from Azure. This data must be analyzed.
- Receive analysis:
  - The main project may obtain analysis from the domain expert. This must be sent to the user for viewing.
- Receive questions:
  - The main project may obtain questions from the user. This must be sent to the domain expert for answering.
- Receive answers:
  - The main project may obtain answers from the domain expert. This must be sent to the user for viewing.
- Receive credentials:

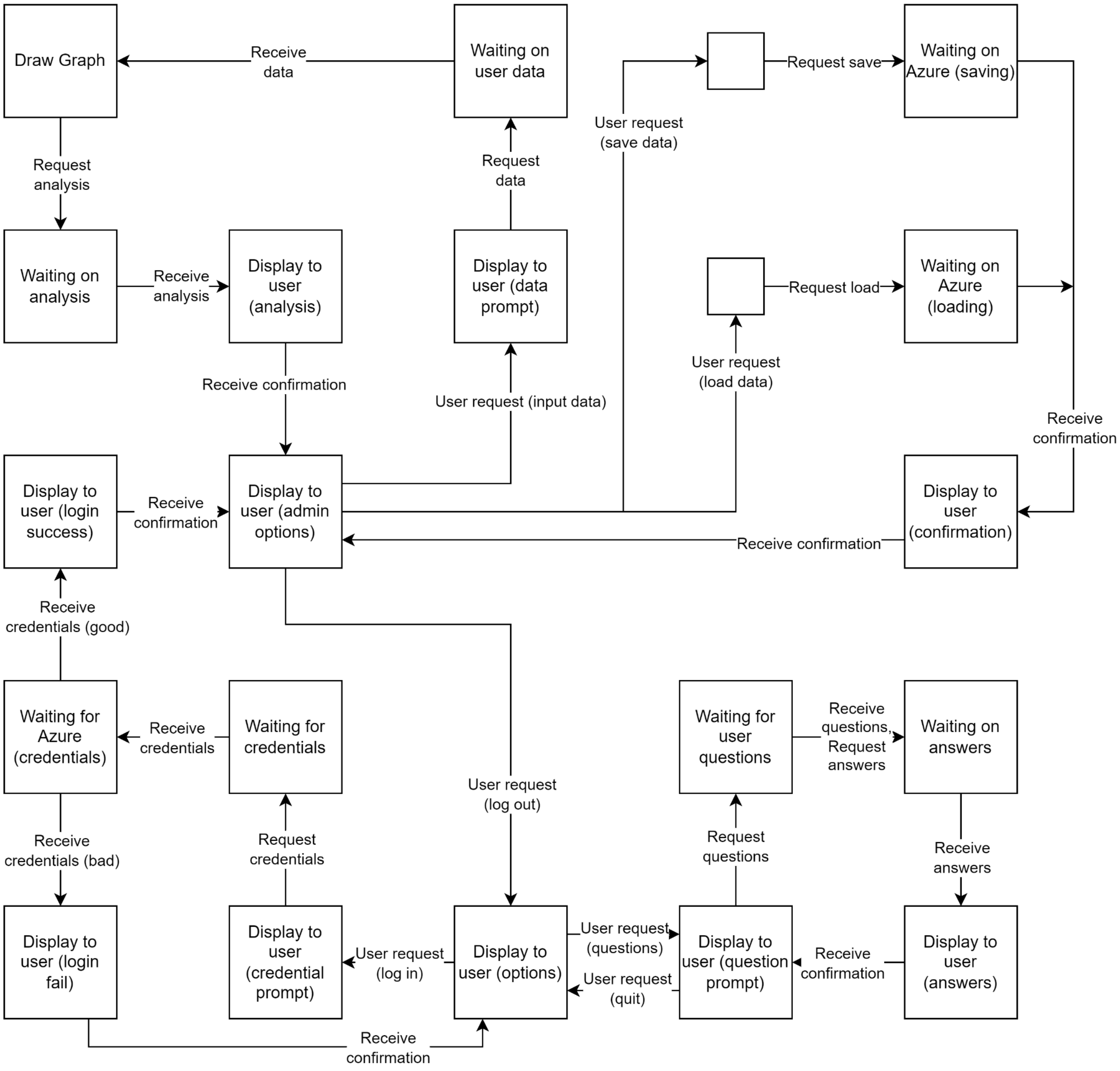
  - The main project may receive login credentials from the user or from Azure.
- Receive confirmation:
  - The main project may obtain confirmation for any source that its operation is complete.
- Request data:
  - The main project may request data from the user or from Azure.
- Request analysis:
  - The main project may request analysis from the domain expert. It must send the data in order to get a response.
- Request questions:
  - The main project may request questions from the user.
- Request answers:
  - The main project may request answers from the domain expert. It must send the questions in order to get a response.
- Request save:
  - The main project may request data be saved.
- Request credentials:
  - The main project may request login credentials from the user or from Azure.

5.1.2 States

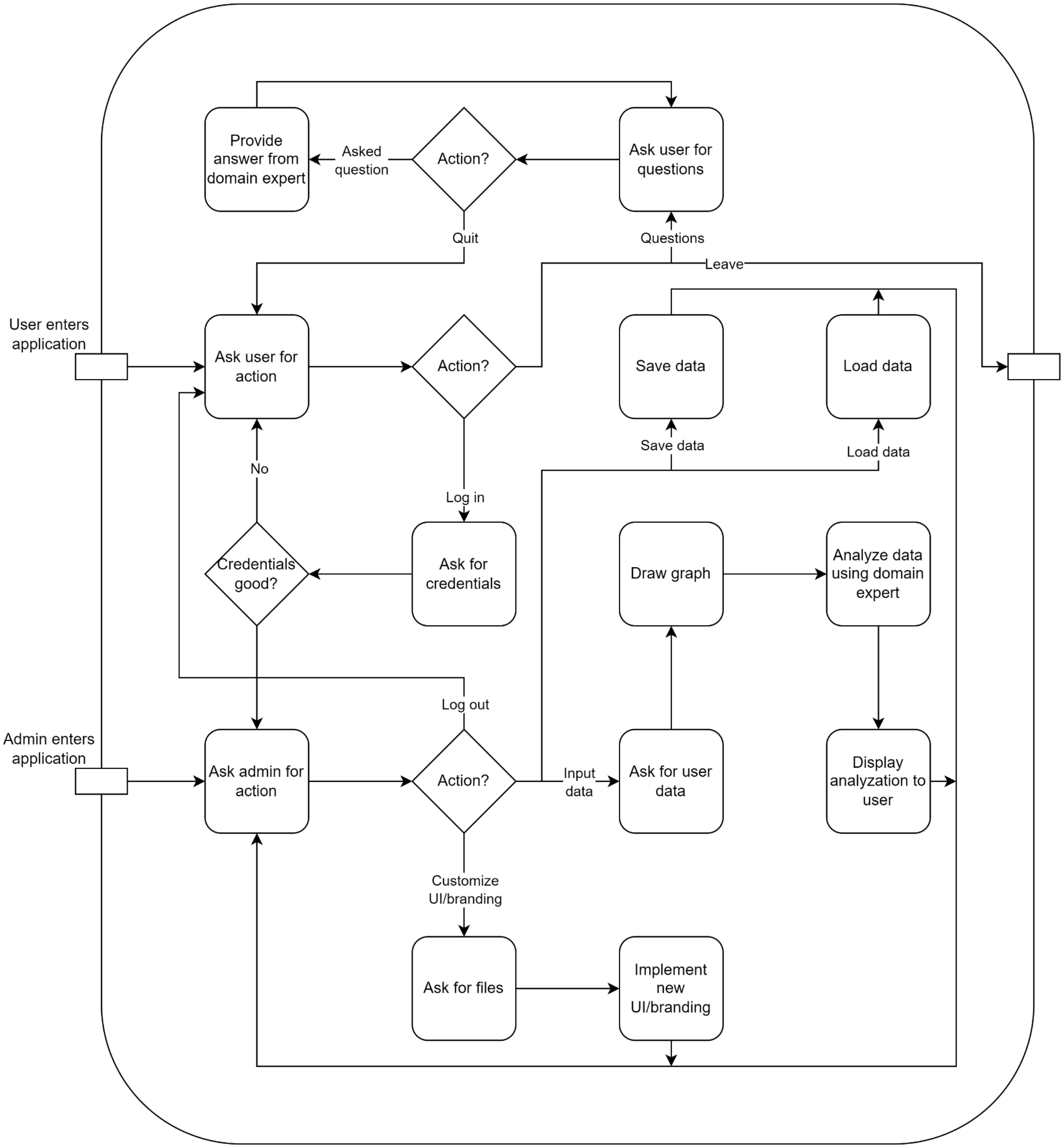
A listing of states (modes of behavior) that will result as a consequence of events is presented.

- Draw graph:
  - The data has been received and is being processed into a graph.
- Waiting for user data:
  - We have asked the user to input data and are waiting on them.
- Waiting for credentials:
  - We have asked the user to input login credentials and are waiting on them.
- Waiting for domain expert analysis:
  - We have sent the graphs to the domain expert and are waiting on analysis.
- Waiting for Azure (saving):
  - We have requested for Azure to save the data and are waiting for confirmation.
- Waiting for Azure (loading):
  - We have requested for Azure to send us the data.
- Waiting for Azure (credentials):
  - We have requested for Azure to send us encrypted credentials for our
- Waiting for user questions:
  - We have asked the user to input questions and are waiting on them.
- Waiting for domain expert answers:
  - We have asked the domain expert the questions and are waiting on answers.
- Display to user:
  - Something needs to be shown to the user. The user must proceed by confirming or making a request.

5.2 State Transition Diagrams


Draw Graph
Receive data
Waiting on user data
Request save
Waiting on Azure (saving)
User request (save data)
Request analysis
Request data
Waiting on analysis
Receive analysis
Display to user (analysis)
Display to user (data prompt)
Request load
Waiting on Azure (loading)
User request (load data)
Receive confirmation
User request (input data)
Receive confirmation
Display to user (login success)
Receive confirmation
Display to user (admin options)
Display to user (confirmation)
Receive confirmation
Receive credentials (good)
Waiting for Azure (credentials)
Receive credentials
Waiting for credentials
User request (log out)
Waiting for user questions
Receive questions, Request answers
Waiting on answers
Receive credentials (bad)
Request credentials
Request questions
Receive answers
Display to user (login fail)
Display to user (credential prompt)
User request (log in)
Display to user (options)
User request (questions)
User request (quit)
Display to user (question prompt)
Receive confirmation
Display to user (answers)
Receive confirmation

5.3 Activity Diagram



6.0 Restrictions, Limitations, and Constraints

6.1 Agile Development

This project follows an agile methodology. While this allows the team some degree of flexibility and adaptability, it also means that the project's specifications and requirements may evolve throughout development. Client feedback and changing priorities may impact the project's direction, requiring constant communication and adjustments with negotiation on what the team can or can not deliver.

6.2 Data Storage Requirement
We are required to use Azure as the primary platform for storing datasets. This constraint limits our choices for data storage solutions to those compatible with Azure, as well as introducing difficulties of the Azure platform. Understanding how to interact with Azure is the primary difficulty.

6.3 Resource Availability
Resource availability, including human resources, limited student budget (as Azure can be pricey), and Azure's infrastructure are all subject to constraints. These limitations may impact the speed of development and the scope of features that can be implemented within the project's timeline and budget.

6.4 Scalability and Performance
The ability of Llama Lingo's architecture to handle increased under-the-hood workloads to provide smooth user interactions may be constrained by hardware, software, or budget limitations consequential to using Azure.

7.0 Validation Criteria

7.1 Classes of Tests

The following test classes are specified for the validation of the software:

- Test Class 1: Functional Testing
  - Objective: To ensure that the application's core functionalities work as expected.
  - Test Cases:
    - Admin Panel Login Process
    - Admin Panel Logout Process
    - Admin Menu Branding
    - Admin POD CRUD (Parsed Object Dataset)
    - Admin Location CRUD (Storage Account)
    - End User Inputs Inquiry
    - End User Receives Inquiry Result
  - Expected Outcome: All test cases should pass without any critical issues.
- Test Class 2: Security Testing
  - Objective: To validate the security measures implemented in the application.
  - Test Cases:

        - Unauthorized access attempts
        - Handling of login credentials
    - Expected Outcome: The application should protect user and admin data, prevent unauthorized access, and securely handle sensitive information.
- Test Class 3: Usability Testing
    - Objective: To assess the application's user-friendliness and ease of navigation.
    - Test Cases:
        - User interface intuitiveness
        - Accessibility for users with impairments
        - User independence and ease of navigation
    - Expected Outcome: The application should have an intuitive user interface, support accessibility features, and be easy to navigate without assistance.

7.2 Expected Software Response

- Admin Panel Login Process:
    - Expected software response: Successful login and access to admin panel.
    - Failure response: Display an error message and prompt the user to try again.
- Admin Panel Logout Process:
    - Expected software response: Successful logout and return to the main application.
    - Failure response: Display an error message if the logout process fails.
- Admin Menu Branding:
    - Expected software response: Successful branding customization and application interface changes.
    - Failure response: Display an error message in case of issues with branding.
- Admin POD CRUD (Parsed Object Dataset):
    - Expected software response: Successful CRUD operations on the Parsed Object Dataset.
    - Failure response: Display an error message in case of any issues with CRUD operations.
- Admin Location CRUD (Storage Account):
    - Expected software response: Successful CRUD operations on the Storage Location.
    - Failure response: Display an error message in case of any issues with CRUD operations.
- End User Inputs Inquiry:
    - Expected software response: Acceptance of user inquiries into the application's question prompt.
    - Failure response: Prompt the user to input relevant inquiries if unrelated to the application's topic.

- End User Receives Inquiry Result:
    - Expected software response: User receives relevant answers to their inquiries.
    - Failure response: Prompt the user to enter relevant inquiries if the application cannot provide a relevant answer.

7.3 Performance Bounds

- Response Time:
    - The application should respond to user inquiries within a reasonable time frame, typically within a few seconds.
    - The performance bounds for response times should be well within acceptable limits to provide a smooth user experience.
- Load Handling:
    - The application should be able to handle a reasonable number of concurrent users without significant performance degradation.
    - Specific limits for concurrent users will be defined and tested, but the application should aim for high scalability.

8.0 Appendices

8.1 System Traceability Matrix

Requirements Traceability Matrix					
Business Requirements Document		Functional Requirements Document		Components Document	
Requireme nt ID	Use Case	Requirement ID	Additional Use Cases	Priority	Test Case IDs
#BR_1	Admin Menu Authentication	#FR_1_1	Logging in	High	AM#1a
		#FR_1_2	Logging out	High	AM#1b
		#FR_1_3	Admin Menu displays when logged in	High	AM#1c
		#FR_1_4	Administrator inputted wrong information, can't log in	High	AM#1d
#BR_2	Admin Menu Customization	#FR_2_1	Administrator can change displayed logos	Medium	AM#2a
		#FR_2_2	Administrator can change text, fonts, text color	Low	AM#2b
		#FR_2_3	Administrator can change background colors	Low	AM#2c
#BR_3	Database Filestream	#FR3_1	Administrator can read a file from the database.	Medium	AM#3a
		#FR_3_2	Administrator can create a new file in the database	Medium	AM#3b
		#FR_3_3	Administrator can modify a file in the database	Medium	AM#3D
		#FR_3_4	Administrator can replace a file in the database with a new file	Medium	AM#3E
#BR_4	User Inquiry	#FR_4_1	User can ask a question	High	AM#4A
		#FR_4_2	Server receives inquiry	High	AM#4B
		#FR_4_3	Server generates response	High	AM#4C
		#FR_4_4	Server sends response, client receives	High	AM#4D
		#FR_4_5	Response is relevant and accurate	High	AM#4E

8.2 Product Strategies

The project will utilize the following strategies to achieve its goals:

- **Continuous Agile Development:** The development process used will obey agile methodology, allowing flexibility for adaptations and expansions as requirements evolve.
- **Modularity:** The application will be developed with modularity in mind to accommodate integration alongside APIs of ANI experts.
- **Expertise Expansions:** The application knowledge will be periodically expanded with new details within given topics.
- **User-Centricity:** Client and test user feedback will be consistently sought and integrated to enhance experience and knowledge coverage.
- **Information Security & Privacy:** Security measures will be employed where possible to ensure that user interactions are protected.

8.3 Analysis Metrics to be Used

The following metrics will be used to evaluate the effectiveness of the developed application:

- **User Engagement:** User counts, number of interactions, duration of sessions, and frequency of inquiries will be used to assess user engagement.
- **Accuracy of Responses:** Application answers will be verified to ensure that ANI experts are providing correct responses.
- **Response Time:** The time taken by ANI experts to give responses and users to receive the responses will be measured.
- **Feedback:** Client and test user feedback will be consistently sought and integrated to enhance experience and knowledge coverage.

8.4 Supplementary Information (as required)

- R.S. Pressman & Associates, Inc.., www.rspa.com/docs/index.html. Accessed 3 Oct. 2023.
- Ravi Bandakkanavar: A Techie, et al. “Software Requirements Specification Document with Example.” Krazytech, 17 Oct. 2019, https://krazytech.com/projects/sample-software-requirements-specificationsrs-report-airline-database/amp. Accessed 3 Oct. 2023.
- “Software Requirements Specification (SRS) Project X 1 Introduction.” Studylib.net, https://studylib.net/doc/15699636/software-requirements-specification--srs--project-x-1--in. Accessed 3 Oct. 2023.