

System Requirements Specification

MEDICAL TOOL WEB APPLICATION

VERSION: 1.0

REVISION DATE: 04/21/2020

GROUP 2

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Section 1: Introduction

1.1 Purpose

The purpose of this document is to explain the various requirements and capabilities of the Medical Tool Web Application.

1.2 Business Context

The Medical Tool Web Application is being developed based on the visions of Dr. Robert A. Marino and under the guidance of Dr. Sanethia Thomas and associates.

1.3 Scope

The Medical Tool Web Application shall allow for quick retrieval of medical tools through keyword search and image identification. Additionally, the system shall allow for analysis of retrieval times for identification of tools taking unusually long to retrieve.

1.4 User Characteristics

There shall be two types of users involved with the system: unauthenticated users and authenticated users.

1.4.1 Unauthenticated Users

Unauthenticated users shall be represented by nurses in the operating room. Unauthenticated users shall not be required to have login credentials and shall use either a computer or mobile device to run the system.

1.4.2 Authenticated Users

Authenticated users shall be represented by the owner of the system (master) or their associates. Authenticated users shall be required to have login credentials and shall use either a computer or mobile device to run the system.

Section 2: General System Description

2.1 Overview of Goals for the System

2.1.1 Easy Identification of Tools

- *Allow for keyword searching to quickly find tools*
- *Allow images to be associated with keywords to allow for verification of the tool being retrieved by the doctor.*

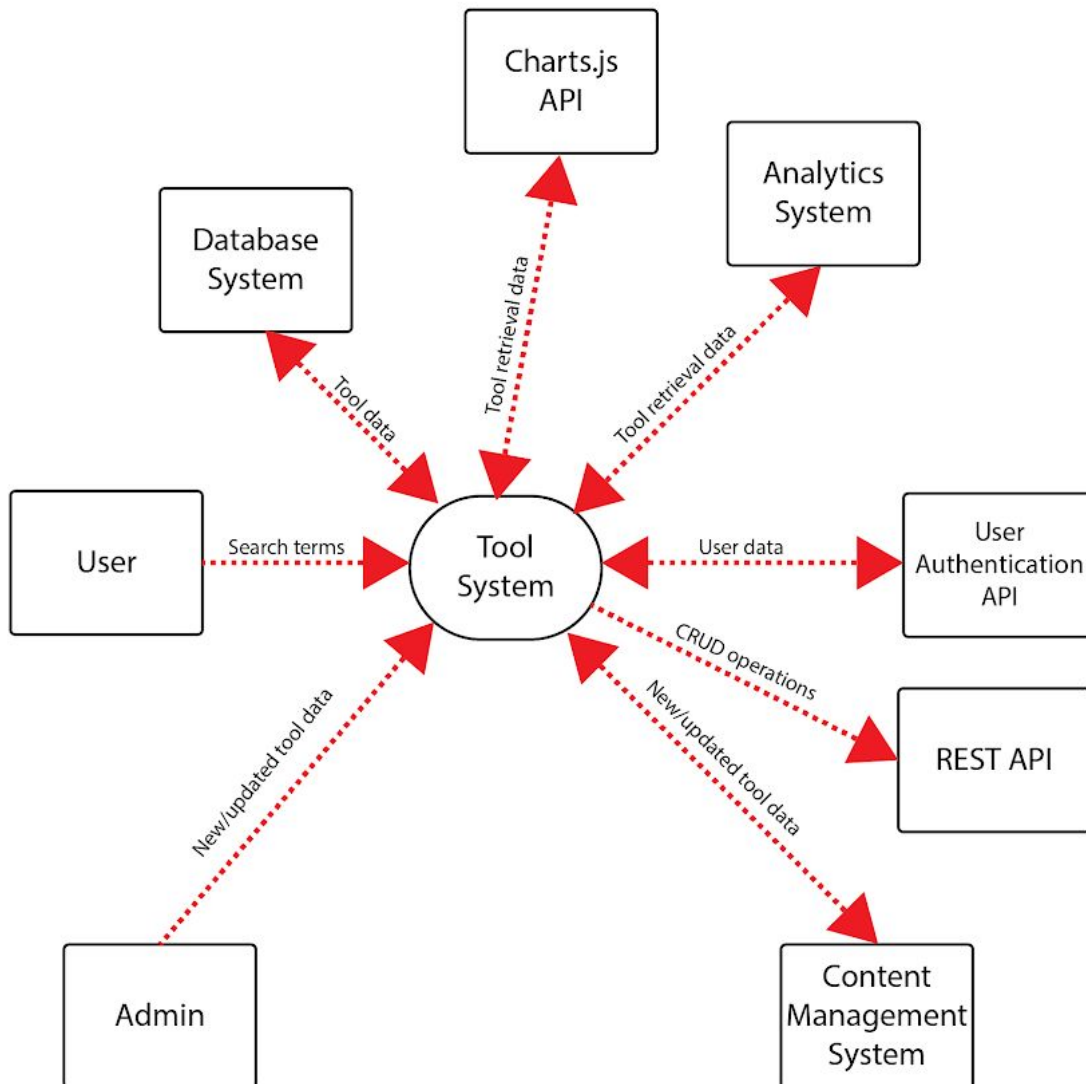
2.1.2 Fast Retrieval Process

- *Ensure the system is fast, accurate, and reliable to improve tool retrieval times in the operating room.*

2.1.3 Retrieval Analysis and Insights

- *Allow for analysis of retrieval times for insights into which tools are slow to retrieve.*

2.2 System Context Model



2.3 System Requirements

2.3.1 API Keys and Step-By-Step Replacement

The three APIs and their respective information are listed below:

1. REST API (CRUD) with MongoDB Atlas

- a. Requires MongoDB URI in order to function properly
2. User Authentication with BCrypt and MongoDB Atlas
 - a. Requires MongoDB URI in order to function properly
3. Chart.js
 - a. No key required, follow the install process noted below

2.3.2 Environmental Variables

The following environmental variables should be considered:

- process.env.NODE_ENV
 - This could be in three possible states, development, staging and production
 - Development is for testing locally on your machine
 - Production is for deploying on Heroku
 - Staging is unused and should not be used
- process.env.DB_URI
 - This contains the URI for the database
 - This environment variable is stored in Heroku and should be stored as an environment variable in similar environments. During development, a local config.js file serves as the reference for the database URI.

2.3.3 Log-In Credentials

In order to log in with admin privileges, the following credentials must be entered into the username and password section on the login page.

- Username: admin
- Password: password

This account is the master account which can manage all other created accounts

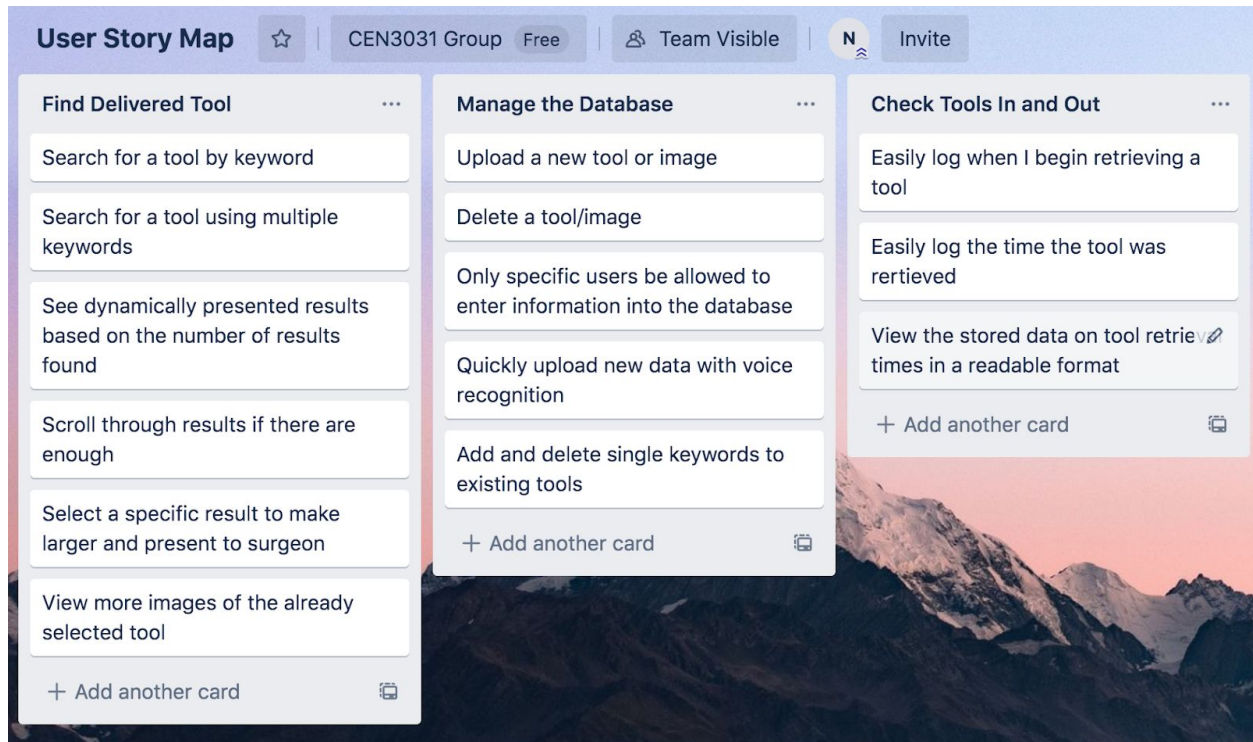
2.4 Technology Stack

Our technology stack curates a web-based application for our users to interact with. To properly utilize our application, the user must simply access the appropriate web address using any major web browser. Our primary technology stack is the MERN stack, consisting of Mongo Database, Express JS, React JS and Node JS. The application itself is deployed on the platform Heroku.

Because of the stack used, the application itself depends heavily on these technologies. The usage of each is integrated throughout the entire code base. A desire to switch to a different database platform, for example, would require extensive changes in the codebase.

Section 3: System Capabilities, Conditions, and Constraints

3.1 User Stories, Story Map



*As a **user**, I want to be able to search by keyword so that I may find my desired tool.*

*As a **user**, I want to be able to search for multiple keywords at once so that my search results can be more specific.*

*As a **user**, I want my results to be dynamically sized so that I can navigate search results efficiently.*

*As a **user**, I want to be able to scroll through results so that I can see all images presented if the amount of results is large.*

*As a **user**, I want to be able to select a specific result/image and enlarge it so that I can present my results to the surgeon.*

*As a **user**, I want to be able to see more images of a selected tool (if they are available) so that I can be sure of what the tool looks like.*

*As an **admin**, I want to be able to upload a new tool/image so that our database reflects the entirety of what our staff may need to use/obtain.*

*As an **admin**, I want to be able to use voice recognition when creating new database items so that I may enter many items quickly.*

*As an **admin**, I want only specific users to be able to modify the database so that we can ensure the data is completely accurate and consistent.*

*As an **admin**, I want to be able to delete a single tool so that a tool we no longer use can be removed from the data.*

*As an **admin**, I want to be able to delete keywords from tools so that we only have the keywords we want to be associated with specific tools.*

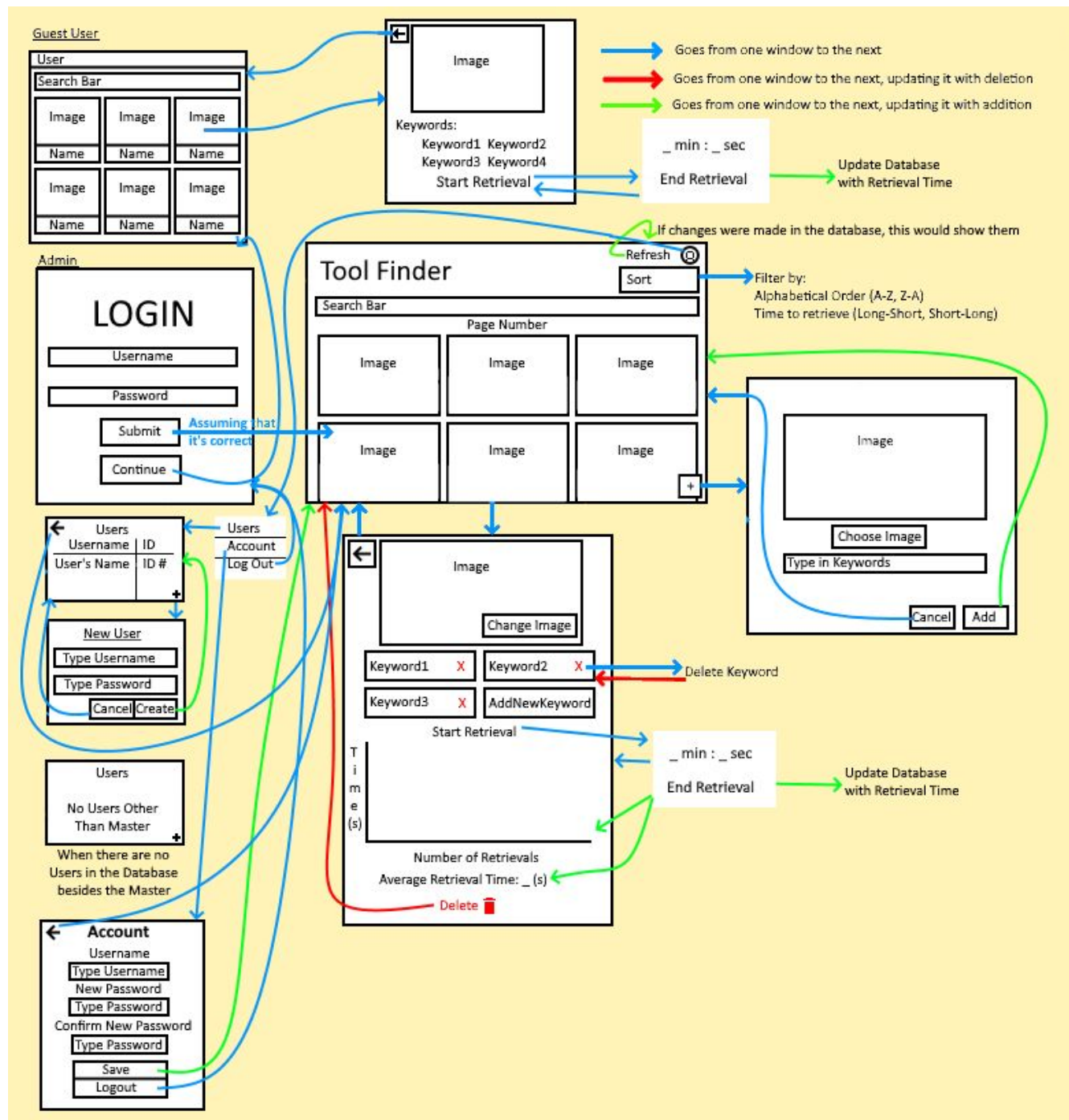
*As an **admin**, I want to be able to add keywords to a specific tool so that I do not need to delete and re-upload a tool just to add a keyword.*

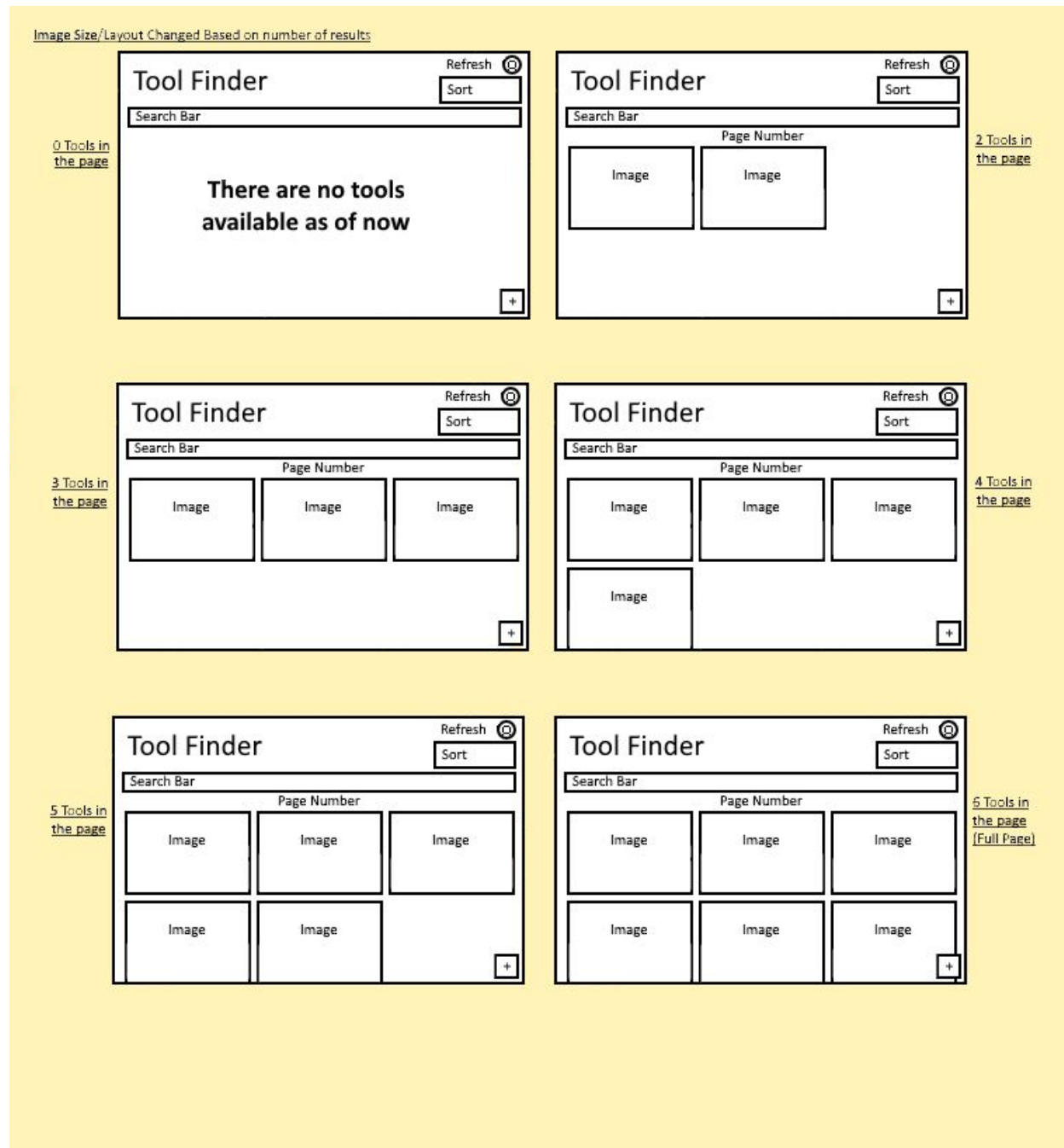
*As a **user**, I want to be able to log what time a tool was originally sought after so that there is a record of a tool being used.*

*As a **user**, I want to be able to log when a tool was obtained so that it is clear if a tool is currently being used or not.*

*As a **user**, I want to be able to see the data on how long it takes to retrieve certain tools.*

3.2 Wireframes





3.3 Description of Features

3.3.1 Tool Search

Purpose

To search for tools in the database matching a set of keywords.

Inputs

A list of keywords separated by spaces.

A list of tools (provided from the database).

Operations

The system shall parse the keywords provided and identify tools matching all of the keywords provided.

Outputs

A list of tools that match all provided keywords (in some cases, the list shall be empty).

3.3.2 Logging of Retrieval Time

Purpose

To log the time it takes to retrieve a tool from storage in the database.

Inputs

The id of the tool.

A new retrieval time, in seconds (provided from the user interface).

Operations

The system shall update the retrieval history of the tool with the new retrieval time and calculate a new average retrieval time based on the 30 most recent retrieval times.

Outputs

The success or failure of the operation.

Reasons for failure:

- *A weak internet connection or lack of internet connection.*

The updated retrieval history of the tool in the database, provided a successful operation.

3.3.3 Average Retrieval Time

Purpose

To log the average retrieval time across the most recent retrieval history.

Inputs

The id of the tool.

Operations

The system shall output the average retrieval time based on the 30 most recent retrieval times.

Outputs

The success or failure of the operation.

Reasons for failure:

- *A weak internet connection or lack of internet connection.*

The average retrieval time of the tool, provided a successful operation.

3.3.4 Sorting Tools by Retrieval Time

Purpose

To display a list of tools sorted by retrieval time (ascending or descending).

Inputs

A direction to sort the tools by retrieval time (ascending or descending).

A list of tools (provided from the database).

Operations

The system shall parse through the list of tools and arrange them by retrieval time in the direction specified by the input.

Outputs

The list of tools sorted by retrieval time in the direction specified by the input.

3.3.5 Creating Tools

Purpose

To allow an authenticated user to create tools to be added to the database.

Inputs

An image to be associated with the tool.

A list of keywords to be associated with the tool.

Operations

The system shall take the given inputs and save the new tool in the database.

Outputs

The success or failure of the operation.

Reasons for failure:

- *An image is not provided for the tool.*
- *Keywords are not provided for the tool.*
- *A weak internet connection or lack of internet connection.*

A new tool in the database, provided a successful operation.

3.3.6 Updating Tools

Purpose

To allow an authenticated user to update tools that are already in the database.

Inputs

The id of the tool.

Optionally, a new image to be associated with the tool.

Optionally, a new list of keywords to be associated with the tool.

Operations

The system shall take the given inputs and update the corresponding tool in the database.

Outputs

The success or failure of the operation.

Reasons for failure:

- *A weak internet connection or lack of internet connection.*

3.3.7 Deleting Tools

Purpose

To allow an authenticated user to delete tools that are already in the database.

Inputs

The id associated with the tool.

Operations

The system shall remove the corresponding tool from the database.

Outputs

The success or failure of the operation.

Reasons for failure:

- *A weak internet connection or lack of internet connection.*

3.3.8 Creating Users

Purpose

To allow the master account to create additional users with administrative access.

Inputs

A username to be associated with the user.

A password to be associated with the user.

Operations

The system shall create a new user in the database that can log in to the site with administrative access.

Outputs

The success or failure of the operation.

Reasons for failure:

- *The username provided is already associated with a user in the database.*
- *The password provided does not meet minimum security standards.*
- *The username and/or password contains illegal characters.*
- *A weak internet connection or lack of internet connection.*

A new user in the database, provided a successful operation.

3.3.9 Updating Users

Purpose

To allow a user to change its own username and/or password.

Inputs

A new username to be associated with the user.

A new password to be associated with the user.

The id associated with the user.

Operations

The system shall update the corresponding user in the database with the new username and the new password, if provided.

Outputs

The success or failure of the operation.

Reasons for failure:

- *The username provided is already associated with a user in the database.*
- *The password provided does not meet minimum security standards.*
- *The username and/or password contains illegal characters.*
- *A weak internet connection or lack of internet connection.*

The updated user in the database, provided a successful operation.

3.3.10 Deleting Users

Purpose

To allow the master account to delete users from the database.

Inputs

The id associated with the user.

Operations

The system shall remove the corresponding user from the database.

Outputs

The success or failure of the operation.

Reasons for failure:

- *A weak internet connection or lack of internet connection.*

3.4 Administrative Content Navigation and Update

3.4.1 Administrative User Login

Navigating to the Login Page

1. If not logged-in, visit login_page (see glossary) in a web browser or click on the “LOGIN” button on the top right of home_page.

Logging In

1. Enter the username associated with the account in the text field labeled “Username”.
2. Enter the password associated with the account in the text field labeled “Password”.
3. Click the “SIGN IN” button, or press enter, to validate the credentials provided.
4. If the credentials are correct, the system will navigate to the home page and will save the administrative access for 24 hours after the moment of login.

Note: The default login credentials for the master account are as follows:

Username: username

Password: password

Updating Credentials

1. Navigate to home_page.
2. Click on the circular profile button located at the top right of the site. Then, click on the button labeled “Account” from the list.

3. OPTIONAL: Enter a new username to be associated with the account in the text field labeled "Username".
4. Enter a new password to be associated with the account in the text field labeled "New Password". To keep the same password, simply enter the same password already associated with the account.
5. Enter the same password in the text field labeled "Confirm New Password".
6. Click on the button labeled "SAVE" to update the credentials associated with the account in the database.

3.4.2 Tool Management

Pre-Requisites

1. Ensure that the user is logged in (see section 3.4.1).

Adding New Tools

1. Navigate to home_page in a web browser.
2. Click on the plus button found at the bottom right of the site.
3. Upload an image to be associated with the tool by clicking on the "UPLOAD AN IMAGE" button and selecting an image from the file system..
4. Add keywords to be associated with the tool. To add keywords, type a keyword in the text field labeled "Keyword" and press enter on the keyboard to add a keyword to the list.
5. Click the "ADD" button to add the new tool to the database.

Updating Existing Tools

1. Navigate to home_page.
2. Click on the tool that needs to be updated (tools can be filtered by keywords using the search bar found above the grid).
3. Click on the pencil button found at the bottom right of the site.
4. OPTIONAL: Choose a new image to be associated with the tool by clicking on the "UPLOAD AN IMAGE" button and selecting an image from the file system.
5. OPTIONAL: Add new keywords to be associated with the tool by typing the keyword in the text field labeled "Keyword" and pressing enter on the keyboard.
6. OPTIONAL: Remove existing keywords to be associated with the tool by clicking on the "x" next to the keyword in the list of keywords.
7. Click on the "SAVE" button to update the tool in the database.

Deleting Existing Tools

1. Navigate to home_page.
2. Click on the tool to delete (tools can be filtered by keywords using the search bar found above the grid).
3. Scroll to the bottom of the page and click the "DELETE" button, colored red.
4. A confirmation window will appear. Click the "CONFIRM" button to delete the tool from the database.

3.4.3 User Management

Pre-Requisites

1. Ensure that the user is logged-in (see section 3.4.1).
2. Ensure that the user is the master user (see glossary).

Adding New Users

1. Navigate to home_page.
2. Click on the circular profile button located at the top right of the site. Then, click on the button labeled “Users” from the list. If “Users” is not visible, then the user currently logged-in is not the master user.
3. Click on the plus button found at the bottom right of the site.
4. Enter a username to be associated with the user in the text field labeled “Username”.
5. Enter a password to be associated with the user in the text field labeled “Password”.
6. Click the “CREATE” button to add the user to the database.

Note: Users created by the master user will not have the ability to create additional users. This functionality is reserved for the master user alone.

Deleting Existing Users

1. Navigate to home_page.
2. Click on the circular profile button located at the top right of the site. Then, click on the button labeled “Users” from the list. If “Users” is not visible, then the user currently logged-in is not the master user.
3. From the list of users, find the user to be deleted by username.
4. Click on the trashcan button, colored red.
5. A confirmation window will appear. Click the “CONFIRM” button to delete the user from the database.

3.5 Project Handoff Guidelines

For this project and the scale, it would be best to work with Heroku. However, some alternatives will be listed down below:

Back4App - <https://www.back4app.com/>

- No vendor lock-in
- Flexible pricing plans
- Automated backup system that keeps your data secure and accessible

General steps to get setup:

1. Create an account on back4app and create an application
2. Use back4app's web hosting service in "My Apps" option of your app
3. Create your domain and upload/make adjustments to incorporate back4app into your project
4. Successfully hosted, for more in-depth information consult:
<https://www.back4app.com/docs/platform/node-js-web-server>

Firebase - <https://firebase.google.com/>

- Cross-platform API, cross-device support
- Fast and real-time updates
- Free tier up to 100 simultaneous connections

General steps to get setup:

1. Create an account on Firebase and create an App
2. Install the Firebase CLI

3. Setup a project directory
4. Deploy your site
5. Link to a Firebase Web App (optional)
6. Successfully hosted, for more in-depth information consult:
https://firebase.google.com/docs/hosting/?authuser=0#implementation_path

For a larger scale of deployment (some considerations, although unnecessary for the scale of this project):

- Google App Engine (GAE) - <https://cloud.google.com/appengine>
 - Flexible pricing plans
 - Much easier to run asynchronous tasks
 - Easy to create, maintain and scale if needed
- Kubernetes - <https://kubernetes.io/>
 - Easy to deploy and manage applications
 - No vendor lock-in
 - Good for advanced developers to use the provided resources
- Amazon Elastic Compute Cloud (EC2) - <https://aws.amazon.com/ec2/>
 - Instant provisioning of new servers
 - Multiple geographic areas to run servers with a standard interface
 - Entire AWS ecosystem of services and support and community

Section 4: Glossary

A list of terms and acronyms used within the document.

Term	Definition
site_link	https://cen3031-final-project.herokuapp.com/
login_page	https://cen3031-final-project.herokuapp.com/Login
home_page	https://cen3031-final-project.herokuapp.com/Home
Admin (administrative user, admin account)	An authenticated user.
master (master account, master user)	An authenticated user with the ability to manage other users. Only one master user/account exists.