D3: Architecture and User Interface Design
Project : Healthcare Appointment Booking System
Project members:
Vishali Chhabra, Angie Wang, Troy Johnson, Cordelle WaldenCameron
Project repository: https://github.com/angie-W-auemail/groupproj_3506.git

1. Introduction

1.1 Purpose

The purpose of this UI documentation is to define the visual, interaction, and functional aspects of the user interface for the healthcare appointment booking system, ensuring system performance of consistent and intuitive user experience for 3 types of end users (admin/doctors/patients) across all platforms.

1.2 Scope

This document covers the overall design strategy, UI components, pages' layouts, user interaction patterns, accessibility standards, and responsive behaviors for the desktop and mobile application.

1.3 Audience

Dev team: developers, UX/UI designers, testers, product manager, product sponsor
Developers : Vishali Chhabra, Angie Wang, Troy Johnson , Cordelle WaldenCameron
Testers: Vishali Chhabra, Angie Wang, Troy Johnson , Cordelle WaldenCameron
UX/UI designers: external sources
end users: admin, doctors, patients

1.4 Glossary of Terms

Breadcrumb: A UI navigation aid showing the user's location in a hierarchy of pages.

2. UI Design Principles and Standards

2.1 UI Design Guidelines

• UI Design Principles: Usability, Consistency, Clarity, Accessibility, Simplicity, Responsiveness, Familiarity.
The UI design will prioritize ease of use for each group of end users, making designs that are clear and simple to understand, consistency in element placement, and accessibility for all users, following modern web standards.

2.2 Design Standards

The design will follow Google's Material Design guidelines to ensure a modern, consistent, and responsive interface. Follows WCAG 2.2 for accessibility.

2.3 UI Patterns and Best Practices

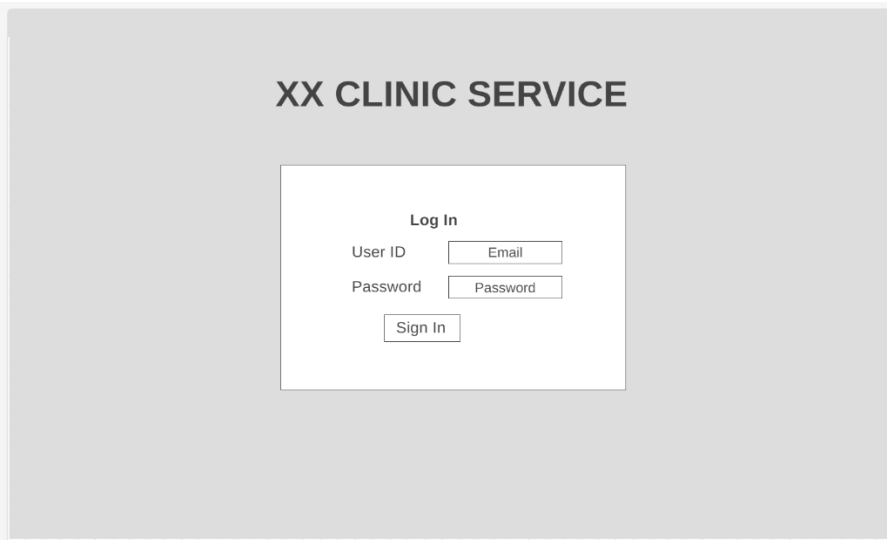
- The application will use a card-based layout for displaying content in grids, a bottom navigation bar for mobile, and modal dialogs for confirmations.
- Use Color Judiciously, ensure a high contrast between text sections and their backgrounds, using Accessible color palette

- Clear Primary Actions: Make buttons stand out with color so users know what to do
- Hover Controls: Hide nonessential information on detailed pages to let users find relevant information more easily
- Communicate and Differentiate a Product Through Visuals: use images and icons to enhance user experience
- Density-Independent Pixels: display elements consistently on screens with different densities.

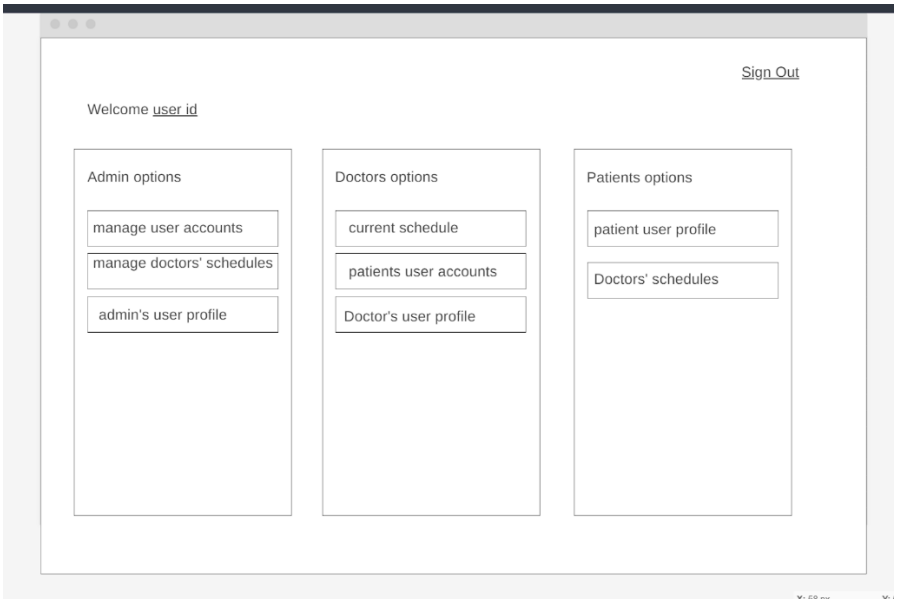
3. UI Layout and Design Specifications

3.1 Wireframes and Mockups

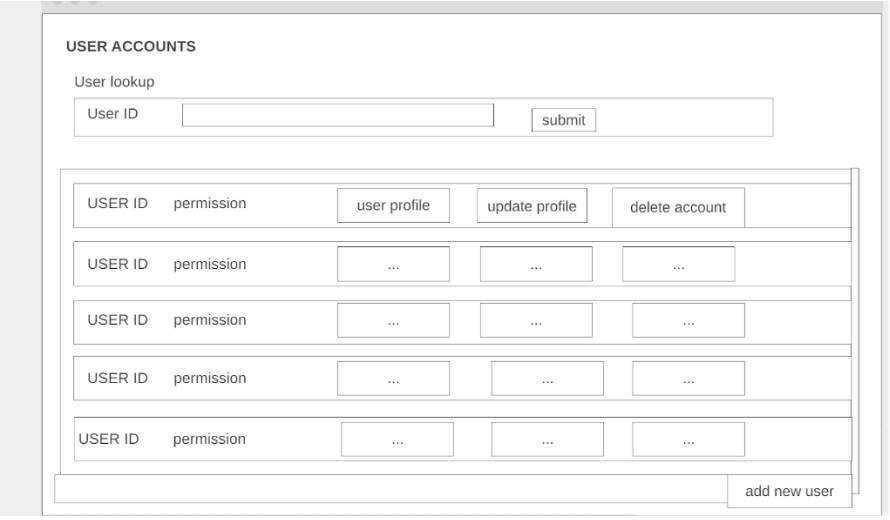
Sign in page wireframe



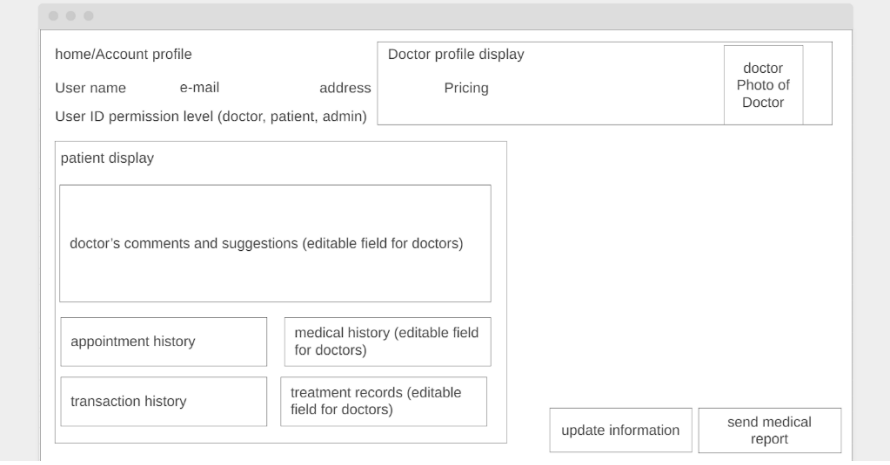
Home page



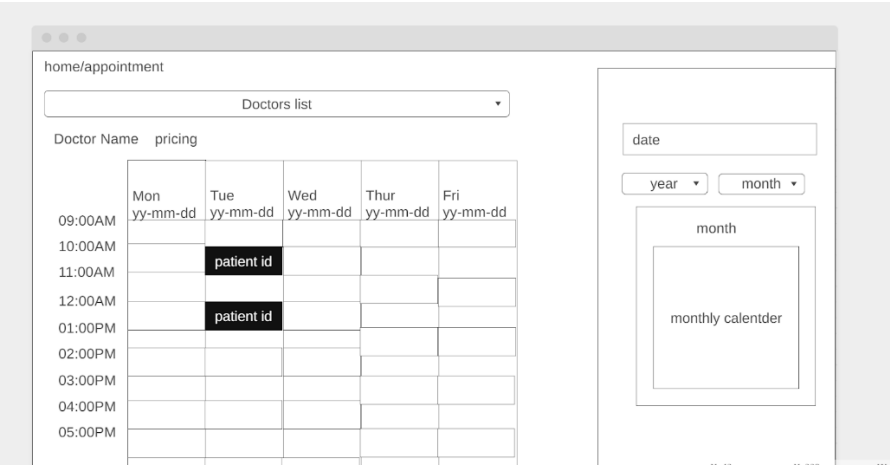
Users account page



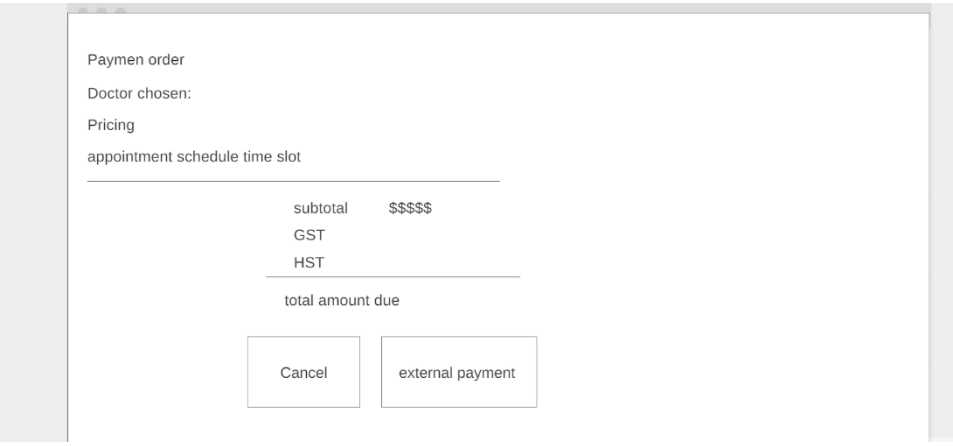
User profile page



Appointment



Payment page



3.2 Page Layout Structure

- The login page will have a center frame for user input tiles for id and password and a sign-in button to submit authentication.

- The homepage layout will feature a top header of sign out option, title displaying user id, navigation bar to different options.

- The user accounts page will feature a title of user accounts, a search panel to look up users, a display frame to display searched users or list of available users alphabetically , each user account row will have button options to navigate to the specific user profile, update the profile, or delete the user. And the bottom of the page will have a new user button.

- The user profile page will display a user's personal information, permission level (doctor, patient, admin), email, doctors' profile page will have pricing listed, patients page will have treatment records, medical history, transaction history, appointment history, doctor's comments and suggestions, button to update profile/settings, and button to generate medical report sent by email

- The appointment page will feature a drop-down menu to select doctors and display schedules accordingly. There is year-month-date selection on the right pane and displays the workdays schedule of the week of the selected date, every date has working hour blocks to be selected as appointment slots, users click on the slot to secure a new appointment.

The payment page will feature a summary of amount due, button to cancel payment and button to external payment tool for transaction

3.3 Visual Design Specifications

Primary Color:

- **Hex:** #0073e6
- **RGB:** (0, 115, 230)

Secondary Color:

- **Hex:** #054fb9
- **RGB:** (5, 79, 185)

Accent Color:

- **Hex:** #f57600
- **RGB:** (245, 118, 0)

Additional Colors

Background Color:

- **Hex:** #ffffff
- **RGB:** (255, 255, 255)

Text Color:

- **Hex:** #000000
- **RGB:** (0, 0, 0)

The font used for the majority of the website will be arial. Headings will use 1.5 rem font size. Body text will use 1 rem.
Icons will be sourced from https://www.flaticon.com/.
Any stock imagery needed will be sourced from https://unsplash.com/

3.4 UI Components

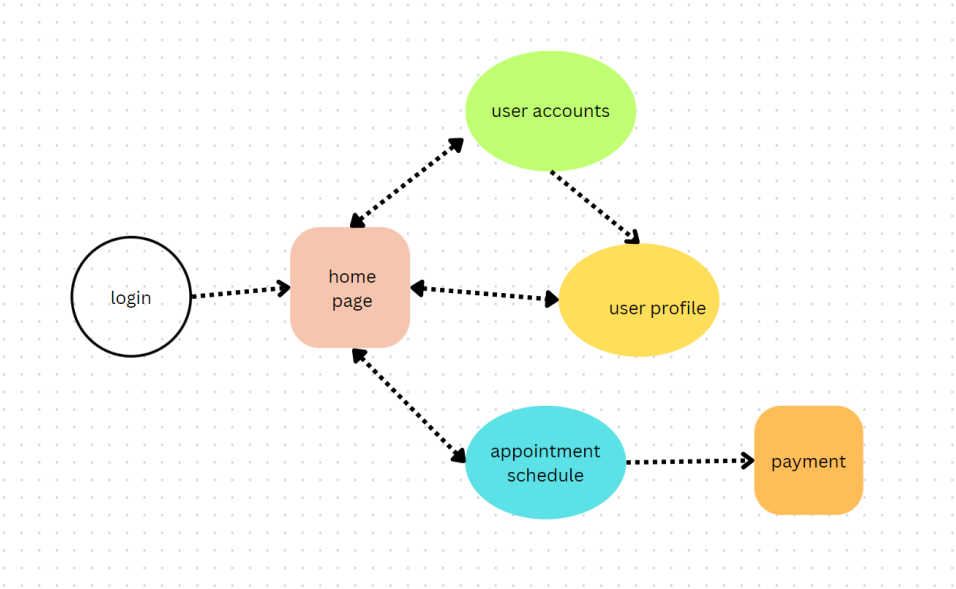
Ui elements will have a dark shade around them when highlighted.
Main elements used will be dropdowns, buttons and input fields.
A buttons default background color will be hex #b9d8fd, hover over has no color change. When clicked buttons will have a darker shade #33a0f7.
Appointment page will have selected month calendar, past dates will be grayed out and disabled to click for patients, selected date will have circle highlight background color hex #dcf2ba
The appointment page will have a schedule of time slots from Mon to Friday, empty time slots will have white background, if time slot taken, then highlight block of color #f0d700 will display the unavailability, if the patient him/her-self has existing appointment on time slots, then the secured time slot will display color of #fdb05e
We will use input validation on input fields, and if the user puts non-valid input a message box will warn the user.
The user profile page will have display phase and edit phase if the user clicks on the update information button, changes will be disabled when normal display of the page, input boxes with original text will be displayed where users can make changes when users are updating information.

3.5 Interaction Design

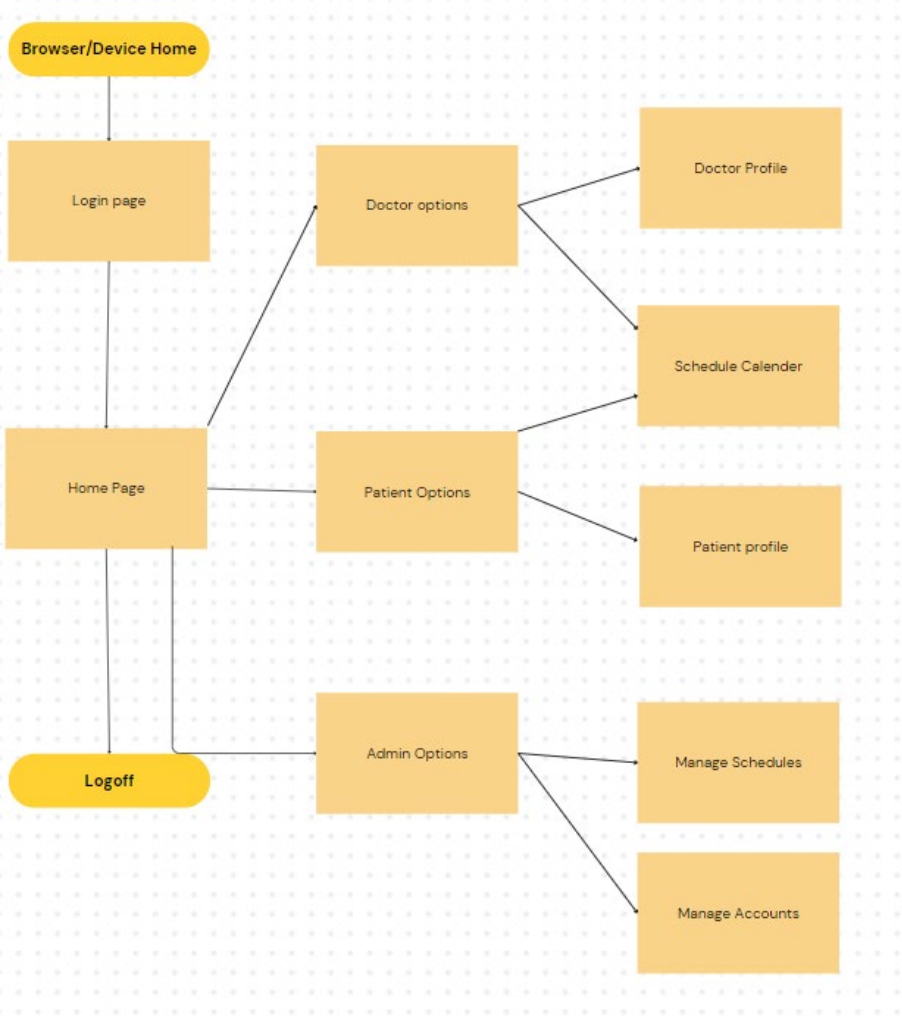
Clicking buttons will trigger an action leads to update
Click on drop-down menu will display list of options in the menu
Input on entry box will display user keyboard input
Clicking on empty time slot of schedule appointment will trigger navigation to payment page with appointment confirmation
Monthly calendar on the appointment page will have days of selected month, past days are grayed out disabled from selection, clicking on a date will highlight the date number with circle highlight background and lead to the appointment schedule change to work week days of the selected date

4. Navigation and Information Architecture

4.1a Navigation Structure



4.1b Site Map - Primary and secondary navigation links



4.2 Menus and Navigation Elements

The top navigation bar will include breadcrumbs links to home page, top right header option to sign out, home page will have card options button to navigate to user-accounts page, user profile page, and appointment schedule page. User accounts page will have rows of users with buttons that navigate to their user profile page. User profile page will have buttons to update information and send a medical report. Appointment schedule page will have doctors dropdown menu to a specific doctor's schedule, date filter to select a specific week of days for appointment, Clicking on empty time-slot will direct to payment order page for securing appointment. Payment page will direct to external payment tool for transaction.

4.3 Breadcrumbs and Links

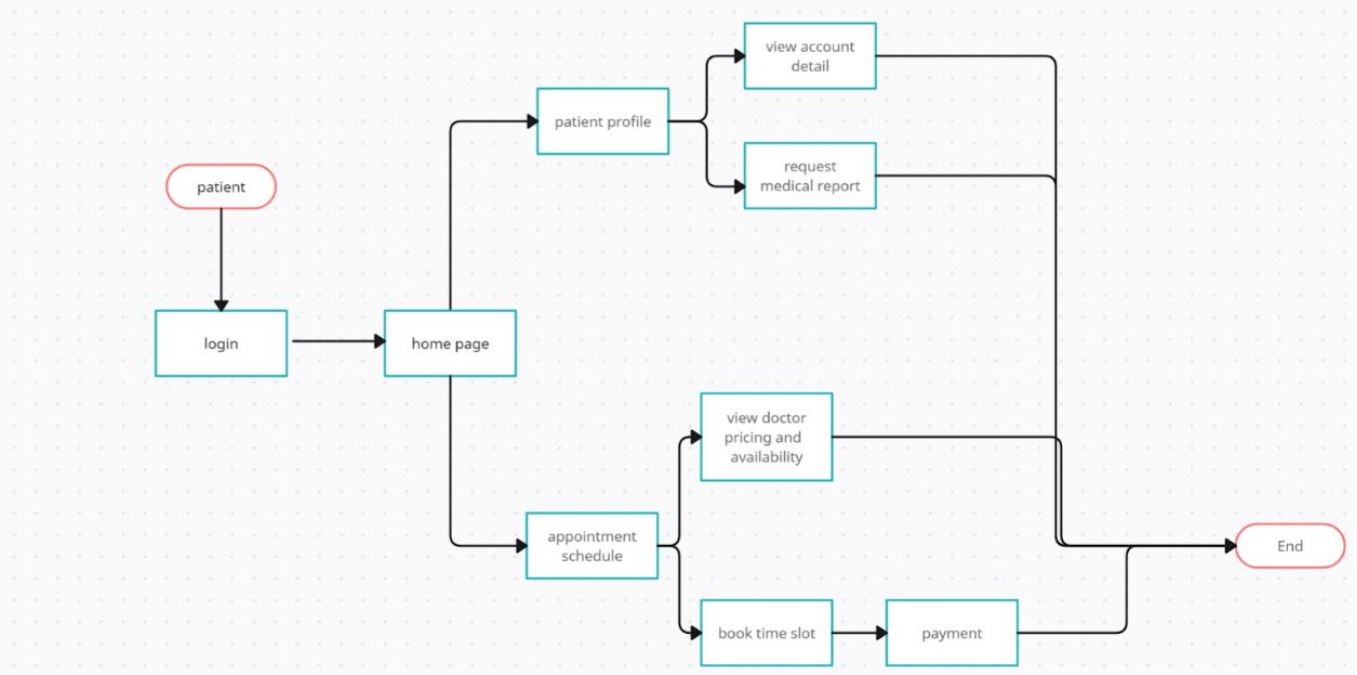
Breadcrumbs will appear at the top of user profile/user accounts/appointment page, showing the user's current location and allowing easy navigation back to the home page.

4.4 Search and Filters

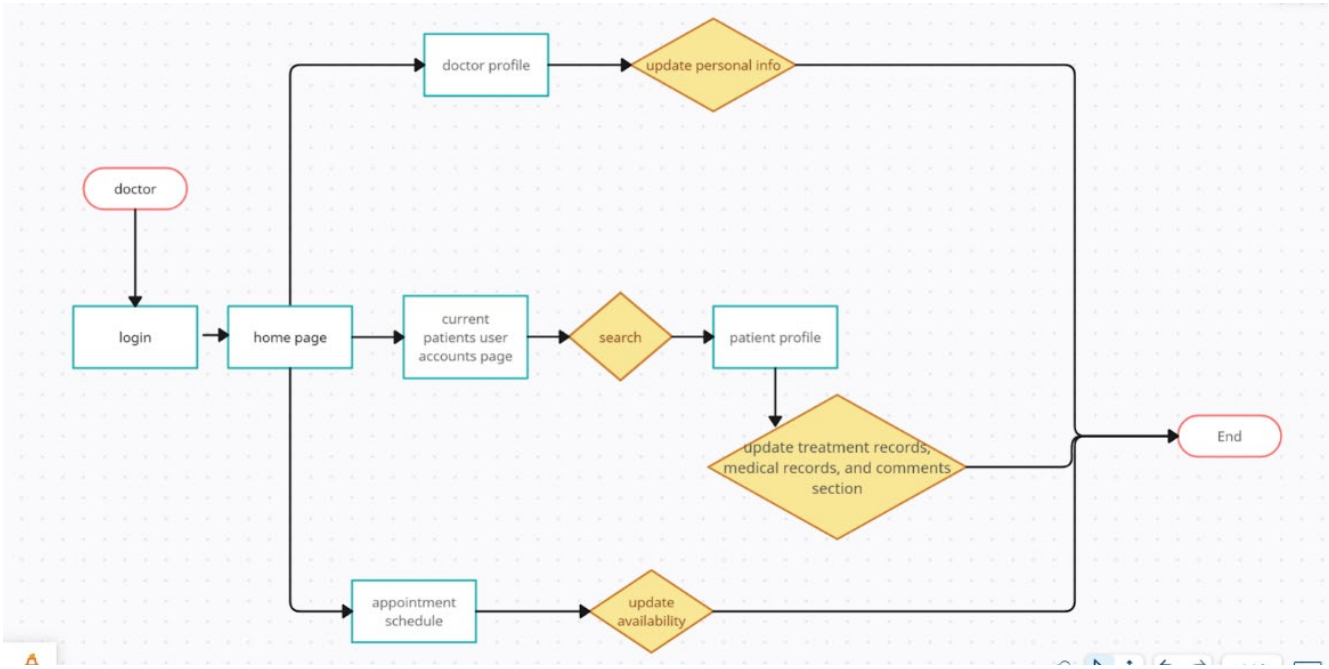
Search option in user accounts will be retrieving specific user id and bring the user's profile option. Appointment page will have drop down menu to search for a doctor and date time filter to select a week of workdays.

4.5 User Flows

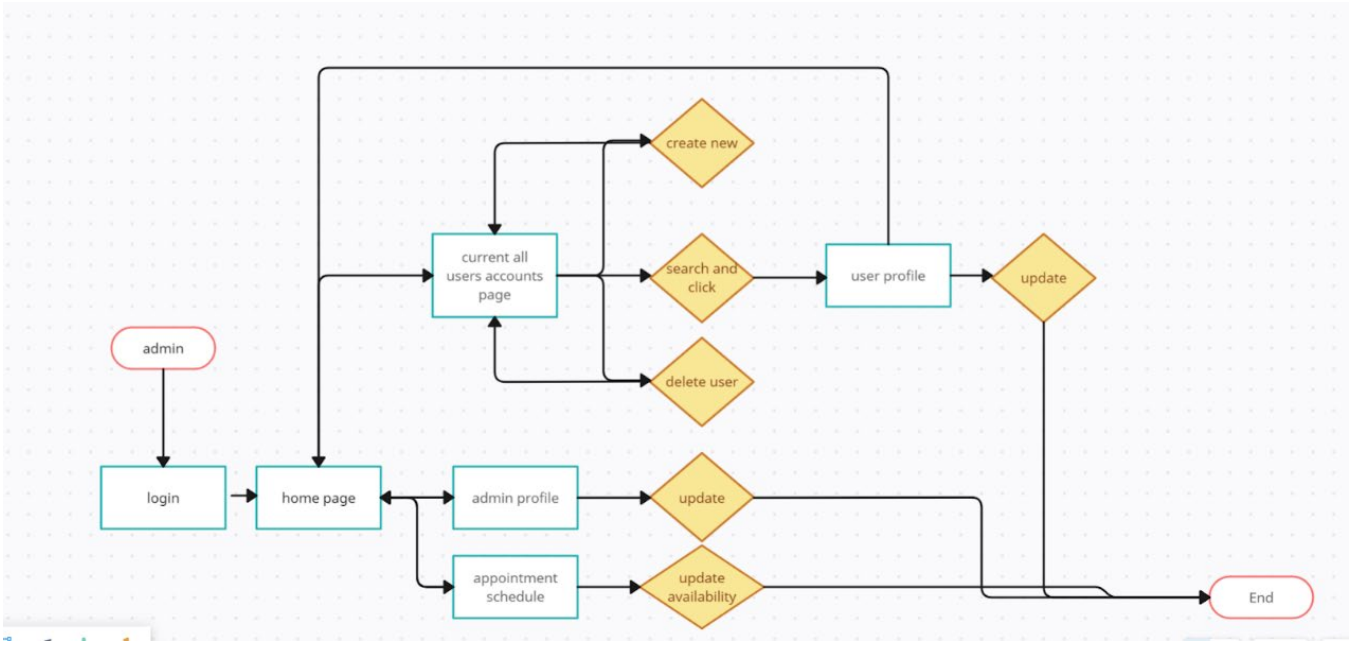
patient



doctor



admin



5. Responsive Design and Mobile Specifications

5.1 Responsive Design Principles

In order to work with both mobile and desktop screen sizes, images, layouts and elements will use relative units/percentages in order to be flexible to layout changes. Ex; using em/rem font sizes.
The system will use media queries to allow the styling to be changed depending on the screen size of the device viewing the content.

5.2 Breakpoints and Layout Adjustments

Breakpoint 1200 px and above

The layout of the website will show a full width header with the logo and the navigation bar fully visible. The form will have full accommodation for the to increase speed and this will also increase readability. The user will see a fully display of patient information, booking information with the form been fully visible to the user.

Breakpoint 992px to 1199px

For the homepage the admin, doctor and patient information will be horizontal under each other. For the appointment page it will be slightly condense with the date, calendar instead of it being on the right side will be below the content to the left. User account page will be more slightly condensed but the same format as the breakpoint above. User profile page will also be the same, being slightly more condensed. Same for the payment page, slightly more condensed but the format will be the same.

Breakpoint 768 to 991px

The Sign in page will change userId textbox been under the text label and also same for password with the text label being under the text label and the sign in button been underneath.

For the homepage the format will remain the same as previous breakpoint with the doctors option being underneath the admin options and also the same with patients option been underneath doctors options.

User account page- the button of user profile, update profile and delete account being underneath user ID and permission label or text starting from the left margin and the same for other userId and permission with the buttons being underneath in the particular format.

User profile page - Home/Account profile will be at the to left, with the doctor profile display underneath and photo of doctor been underneath as well and then patient display will remain in same format and update information and send medical report button been underneath at the bottom starting from the left.

Appointment page - Doctor list will remain in the same position but just taking up 90 percent width of page and then putting or positioning the date, year and calendar section underneath and also taking advantage of width of the page.

Payment page - This will remain the same and just take advantage of the width of the screen in terms of percentage such as 90 percent.

Breakpoint 480 px to 767 px

The format will remain the same as the previous breakpoint for all pages and take advantage of screen width in terms of percentage except the appointment page and User profile page.

The appointment page will have a

- **Select Day**: Dropdown menu for choosing the day.
- **Select Date**: Date picker for selecting the appointment date.
- **Select Time**: Dropdown for available time slots.

All fields will be full-width, with larger buttons for easier touch interaction, ensuring a streamlined experience on smaller screens. Once a date and time is selected it will show it with date, time and patients name below.

The users' account page will feature a single-column layout for optimal mobile usability. Key

components include:

- **User Profile Information**: Displaying the user ID, name, and email at the top.
- **Permissions**: A clear list of user permissions.
- **Buttons**:
    - An "Update Profile" button for making changes.
    - A prominently styled "Delete Account" button for account deletion.

All elements will be full-width with sufficient padding for easy touch interaction, ensuring a streamlined experience on smaller screens.

Breakpoint 480px and below

The format will remain the same as the previous breakpoint for all pages and take advantage of screen width in terms of percentage except the appointment page and user profile page .

The appointment page will have a

- **Select Day**: Dropdown menu for choosing the day.
- **Select Date**: Date picker for selecting the appointment date.
- **Select Time**: Dropdown for available time slots.

All fields will be full-width, with larger buttons for easier touch interaction, ensuring a streamlined experience on smaller screens. Once a date and time is selected it will show it with date, time and patients name below.

The users' account page will feature a single-column layout for optimal mobile usability. Key components include:

- **User Profile Information**: Displaying the user ID, name, and email at the top.
- **Permissions**: A clear list of user permissions.
- **Buttons**:
    - An "Update Profile" button for making changes.
    - A prominently styled "Delete Account" button for account deletion.

All elements will be full-width with sufficient padding for easy touch interaction, ensuring a streamlined experience on smaller screens.

5.3 Mobile-Specific UI Elements

Mobile devices will have collapsible navigation menus.

6. Accessibility Guidelines

6.1 Accessibility Standards

All components will comply with the latest WCAG 2.2 Standards ensuring very readable text, contrast ratio, interface zoom, and ensure content will work with assistive technologies.
https://www.w3.org/WAI/standards-guidelines/wcag/

6.2 Keyboard Navigation

Website will have full keyboard navigation support. The current selected element will be highlighted. Pressing tab will skip to the next element and shift tab will go to the previous element. Elements can be activated by pressing the enter key.

6.3 Screen Reader Compatibility

All elements will have proper labels, and elements that don't use descriptive labels will use aria tags. Images will have alt text under them.

7. Error Handling and Feedback

7.1 Error Messages

Login Error Handling: When users enter incorrect login credentials, a red warning message will appear, indicating the error. The ID and password fields will be cleared to allow for re-entry.
Appointment Booking: If users attempt to book a time slot that is already reserved, a pop-up warning will notify them with the message, “Time slot booked already.”
Real-Time/runtime Validation: Real-time error alerts will appear as users interact with the form. Every invalid field will have a red error message next to it, making it immediately visible. Following the form submission, an overview of all errors will appear at the top, compiling feedback for convenient access.
Validation Indicators: Invalid fields will be highlighted with a red border, making it easy for users to identify and correct errors before submitting the form.

7.2 Success Messages and Feedback

Display Method: A green success banner will descend from the top of the page following a successful action (such as submitting a form), giving the user instant feedback. This banner will automatically fade out after a few seconds of being visible. Contextual Feedback: To make sure users know what was done, success messages will be brief and pertinent to the action performed. For instance, messages will contain information pertinent to the particular activity that was performed.

7.3 Loading Indicators

Use: Loading indicators will let users know when an activity is happening while data is being fetched or forms are being submitted. Design and Positioning: Throughout these procedures, a rotating loader or progress bar will be positioned in the middle of the screen. A brief notification stating that the request is being processed by the system will accompany this loader. To ensure that everyone understands when the procedure is finished, the indication will vanish as soon as the content loads completely or the activity is finished.

8. Prototyping and Usability Testing

Prototyping: It allows the making of any product or system as its prototype, so that visualization and testing may be created by a designer.
Visual Representation: Prototypes allow the stakeholders to actually see how the booking system will work, which shows its layout, navigation, and overall user experience.
Iterative Design: Prototyping allows for iteration. Early prototypes can be low-fidelity, like paper-

based sketches or wireframes, but through the iterative cycle of testing and refinement on feedback from users and stakeholders, become high-fidelity prototypes, for example, interactive digital mockups.

Functionality Testing: Basic functionalities, like searching for available appointments, booking a slot, and viewing appointment details, can also be included in a prototype. This enables the study of whether the basic features of the system fulfill the user's needs.

User Feedback: Involving real users into prototyping is a good way for developers to get significant feedback concerning user needs, preferences, and pain points, which could be used to drive modifications or enhancements needed in development.

Stakeholder Alignment: The prototypes allow the stakeholders to communicate better. It forms a base for reference, which assists in making sure that everyone has the correct perception about the goals and functionality involved in a project.

Usability Testing: Usability testing involves the testing of a product or system with real users. In any healthcare appointment booking system, usability testing forms an essential process that should ensure it is a user-friendly system solving their needs. Here's how it works:

Defining the goals: The first step in usability testing involves identifying the objectives of the test. These might include, among others, the ease with which users are able to use the system to navigate and book appointments or even find information.

Participant Selection: Those participants should be representatives for whom the intended user groups include patients, healthcare providers, and administrative staff to form realistic scenarios.

Scenarios Designing: Test scenarios are designed. These are scenarios that simulate the real tasks that users would want to do in the system, such as searching for doctors or services on offer, booking an appointment, canceling an appointment, or rescheduling.

Conducting Tests: Participants perform tasks while observers-maybe UX designers or people with a vested interest in the project-observe them while they interact. The observers note any difficulties, confusions, or errors that users go through.

Feedback Gathering: After the test, the participants give their feedback, explaining their frustrations, disappointments, and likes.

Analyzing Results: Collected data through usability testing will be analyzed for patterns and common issues that have emerged. This could also involve reviewing task completion rates, error rates, and user satisfaction ratings.

Iterate Designs: The insights from these usability tests can then be used by designers to make informed changes in the system to improve its usability. This might involve redesigning certain interfaces, simplifying workflows, or offering better user support.

Final Testing: Once changes are implemented, further rounds of usability testing can be conducted to ensure adjustments actually help resolve issues that have been identified.

Conclusion: In a nutshell, prototyping enables the exploration and visualization, while usability testing ensures the final product is user-friendly and effective. Both these processes are important in developing a system that will meet user needs and offer a good experience in managing healthcare appointments.

9. Version Control and Change Management

9.1 Version Control

The UI documentation will be stored in a Git repository:
https://github.com/angie-W-auemail/groupproj_3506.git, with branches used for major page components. All changes will be reviewed by the lead designer before merging.

9.2 Handling Design Changes

Any design changes must be discussed via group emails and added to an updated documentation on git

10. Appendices

10.1 Design Assets

All design assets will be updated on a folder in git repository with documentation of source of references.
Color palette will be generated from Venngage accessible-color-palette-generator for compliance to Web Content Accessibility Guidelines
Icons will be sourced from https://www.flaticon.com/.

10.2 References

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