3/12/2024

Software Requirements Specification

Version 1.0

Online Medical Consultation System (OMCS)

Submitted in partial fulfillment of the requirements of Final Project CS 310 Software Engineering

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1. Introduction

1.1 Purpose

The **Online Medical Consultation System (OMCS)** software facilitates remote medical consultations between patients and doctors. It includes purposes like offline appointment scheduling based on location, online consultations, medical history management, prescription handling, billing, patient portal, doctor dashboard, and security compliance. Patients can book appointments with doctors online through the OMCS platform. They can choose the date and type of appointment (offline or online).It aims to enhance accessibility, efficiency, and convenience in health care delivery system and efficient way of booking appointment replacing the traditional way of going to clinic/hospital to book the appointment.

1.2 Document Conventions

1.2.1 Priority Assignment: Every requirement statement (feature) has its a priority assigned to it. Priority levels are typically denoted by their font colour (e.g., **Red** for High, **Orange** for Medium, **Green** for Low) to indicate the importance or urgency of implementation of each requirement.

1.2.2 Highlighting: There is no specific convention for fonts or highlighting used in this SRS. However, for clarity and readability, headings, subheadings, and important sections may be formatted differently (e.g., bold, italic, or underlined text). Additionally, key terms or concepts may be emphasized using bold or italic formatting.

1.3 Intended Audience and Reading Suggestions

Content Organization:

1) Introduction
2) General Description
3) Specific Requirements
4) External Interface Requirements
5) System Features
6) Other Nonfunctional Requirements
7) Appendices

Reading Suggestions:

1) Introduction and General Description
2) Specific Requirements (for Developers & Testers)
3) External Interface Requirements & System Features (for Project Managers & Marketing Staff)
4) System Features (for Users – Doctors and Patients)
5) Appendices

1.4 Product Scope

Purpose:

- Facilitate offline medical consultations based on location
- Enhance accessibility to healthcare services both online and offline
- One-to-one appointment scheduling and improve patient-doctor interactions.

Benefits:

- Increased accessibility and efficiency
- Enhanced patient experience and time-saving

Objectives and Goals:

- Enable seamless communication between patients and doctors.
- Streamline appointment scheduling.
- Maintain comprehensive and secure medical records.
- Enhance efficiency and effectiveness of healthcare delivery.
- Improve patient satisfaction and loyalty.

Alignment with Corporate Goals/Business Strategies:

- Customer-centricity and innovation
- Operational efficiency and cost reduction
- Competitive advantage and vast market.

1.5 References

IEEE. **IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements Specifications.** IEEE Computer Society, 1998.

2. Overall Description

2.1 Product Perspective

The product specified in this Software Requirements Specification (SRS) is a new, self-contained software product designed to address the growing demand for online medical consultation services. It is not a replacement for existing systems, rather an innovative solution aimed at enhancing accessibility to healthcare services through remote consultations. The name of our product is **ConsultEASE** which makes online medical consultations fast and user friendly.

Context and Origin: The need for remote medical consultation services has become increasingly apparent, especially in light of global events such as the COVID-19 pandemic, which highlighted the importance of telemedicine. The origin of this product stems from the desire to leverage technology to improve access to healthcare services, reduce patient wait times, and enhance overall patient satisfaction. It represents a proactive response to evolving healthcare needs, aiming to provide a convenient and efficient platform for patients to consult with healthcare providers remotely.

2.2 Product Functions

2.2.1 Search Doctor

Use Case Name	Search Doctor(Patient Feature)
Trigger	List of doctors sorted based on location is rendered.
Precondition	User must be logged in and should grant permission to browser to access location.
Basic Path	1) The patient chooses how to search doctor. 2) The choices are by specialization or by doctor name. 3) If the search is by specialization, doctors will be sorted based on location. 4) The patient selects a doctor. 5) The system shows the available days in a week for that particular doctor. 6) The Reader requests for an appointment and wait for confirmation.
Postcondition	The appointment is added to the database and is visible to the doctor.
Exception Paths	The Reader may abandon the search at any time.

2.2.2 View Appointment

Use Case Name	View Appointment(Patient Feature)
Trigger	The user clicks on Appointment on Sidebar to view appointments.
Precondition	Appointments should be booked and user must be logged in to view appointments
Basic Path	Access appointments by clicking on “Appointments” section.
Alternative Paths	If the project is locally setup, you can access the database to see the appointments detail. This is solely for development purpose.
Postcondition	Patient can look at all appointments and also cancel appointments not yet confirmed by doctor.

2.2.3 Add/Update Details

Use Case Name	Add/Update details(Patient and Doctor Feature)
Trigger	The user clicks on “Profile” section to view and update personal details.
Precondition	The user must be logged in.
Basic Path	1) The system fetches your details entered while creating account. 2) The User enters the new information and submit it. 3) The system checks that important fields are not blank. 4) Then it updates the database.
Alternative Paths	If in step 2, either field is blank, the user is instructed to add an entry. No validation for correctness is made.
Postcondition	The updated user is added to the database.

2.2.4 Give Feedback

Use Case Name	Give Feedback(Patient Feature)
Trigger	The user gives feedback to past appointments.
Precondition	The user must have completed a consultation.
Basic Path	1) The user goes to view appointment page . 2) All the completed appointment will have a give feedback button. 3) The user will be redirected to a new webpage to give feedback. 4) On submission, the feedback is saved in the database.
Postcondition	The feedback has been added to the database.
Exception Paths	The user may abandon the operation at any time.

2.2.5 View Feedback

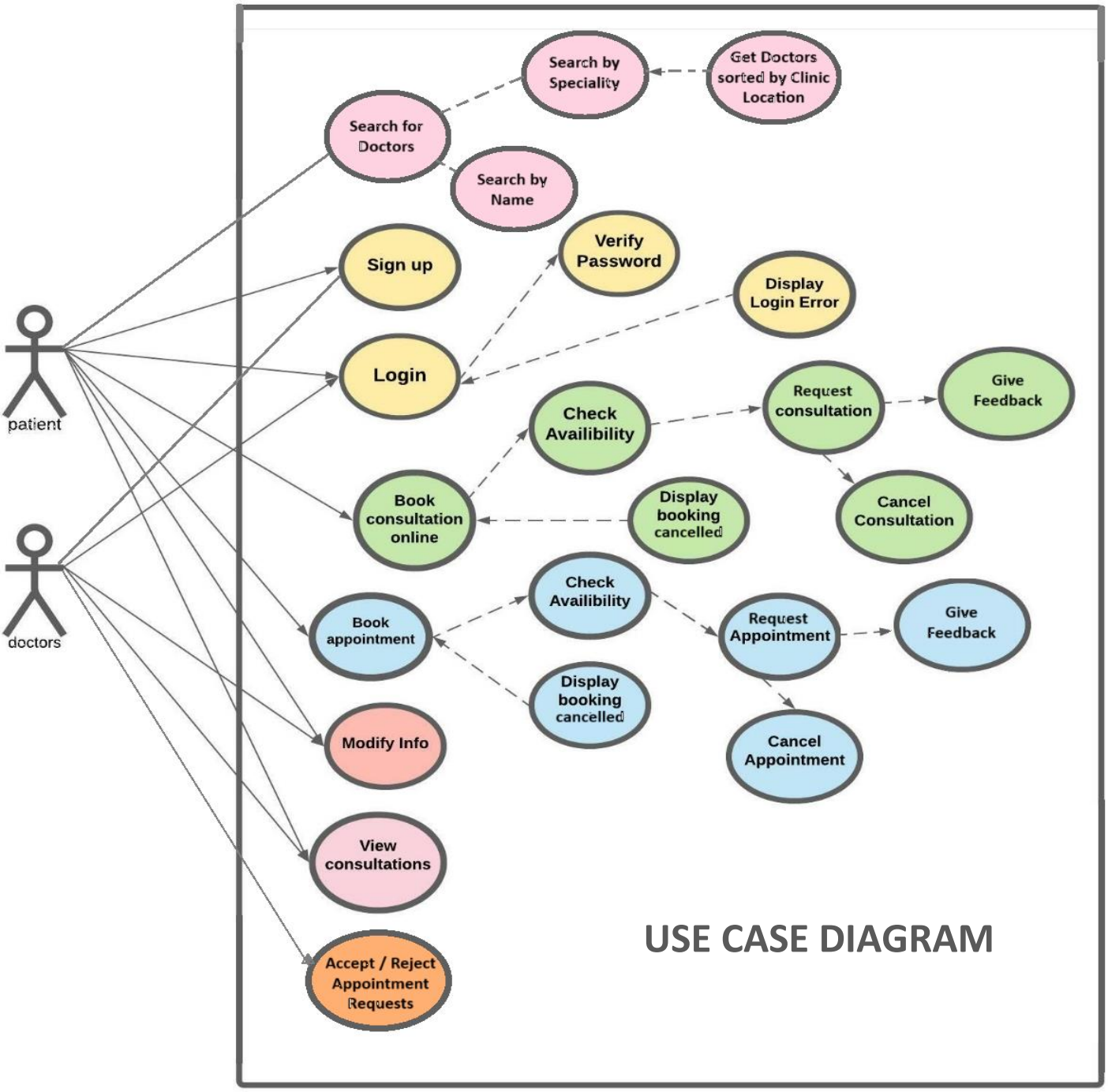
Use Case Name	View Feedback(Doctor Feature)
Trigger	The doctor is able to see feedback provided for past appointments by patients.
Basic Path	1) Go to "View Feedback" section. 2) List of all the feedbacks will be rendered. 3) The rating given during feedback will also affect the doctor rating .
Alternative Paths	None
Postcondition	The doctor's rating column is updated in the database.

2.2.6 Upload Prescription

Use Case Name	Upload prescription(Doctor Feature)
Trigger	The doctor selects to upload the prescription of an online appointment that has already been conducted.
Precondition	The doctor must have already conducted an online appointment.
Basic Path	1) After appointment date has passed, doctor can upload the prescription. 2) Click on "Upload Prescription" button to upload the prescription. 3) The prescription is available for rendering to the patient.
Postcondition	The database has been updated with the prescription.
Exception Paths	If the appointment is not already in the database, the use case is abandoned.

2.2.7 Confirm/Reject Appointment

Use Case Name	Confirm/Cancel Appointment(Doctor Feature)
Trigger	The user selects to either confirm or cancel an appointment.
Precondition	Someone must book an appointment for the doctor to view the list of appointments.
Basic Path	1. The author clicks on the confirm or cancel button. The action is initiated instantly. 2. The status is updated in the database. 1) If the user wishes to confirm an appointment, he/she must provide a time slot as well which will also be stored in the database.
Alternative Paths	In step 3, if "time" field is blank, the user is instructed to add an entry. No validation for correctness is made.
Postcondition	The database has been updated.


Search by Speciality
Get Doctors sorted by Clinic Location
Search for Doctors
Search by Name
Sign up
Verify Password
Display Login Error
patient
Login
Check Availibility
Request consultation
Give Feedback
Book consultation online
Display booking cancelled
Cancel Consultation
doctors
Check Availibility
Book appointment
Request Appointment
Give Feedback
Display booking cancelled
Modify Info
Cancel Appointment
View consultations
Accept / Reject Appointment Requests
USE CASE DIAGRAM

2.3 User Classes and Characteristics

Class : Doctor

Data	Type	Description	Comments
ID	string	Doctor ID	Unique auto-generated
e-mail	string	Unique email ID	Unique
Name	string	Doctor's Name	Need not be unique
Password	string	Account Password	Min. 8 characters, Need not be unique
Age	integer	Doctor's age	Input from doctor
Gender	string	Doctor's Gender	Male/Female
Specialization	string	Specialization of doctor	Field of expertise of doctor
Offline fee	integer	Consultation fee	Offline in-person consultation fee
Online fee	integer	Consultation fee	Online Appointment fee
Latitude	float	Latitude of Doctor's location	Auto-generated from doctor's location
Longitude	float	Longitude of Doctor's location	Auto-generated from doctor's location
Rating	float	Doctor's rating	Based on patients' feedback
Clinic days	string[]	Clinic Operation days	Days on which he is available
No. of Ratings	integer	No. of ratings received	Aids in calculating the rating
Mobile Number	string	Doctor's Mobile number	Not visible to third party
Medical Certificate	LBO	Medical Certificate	Just for proof

Class : Patient

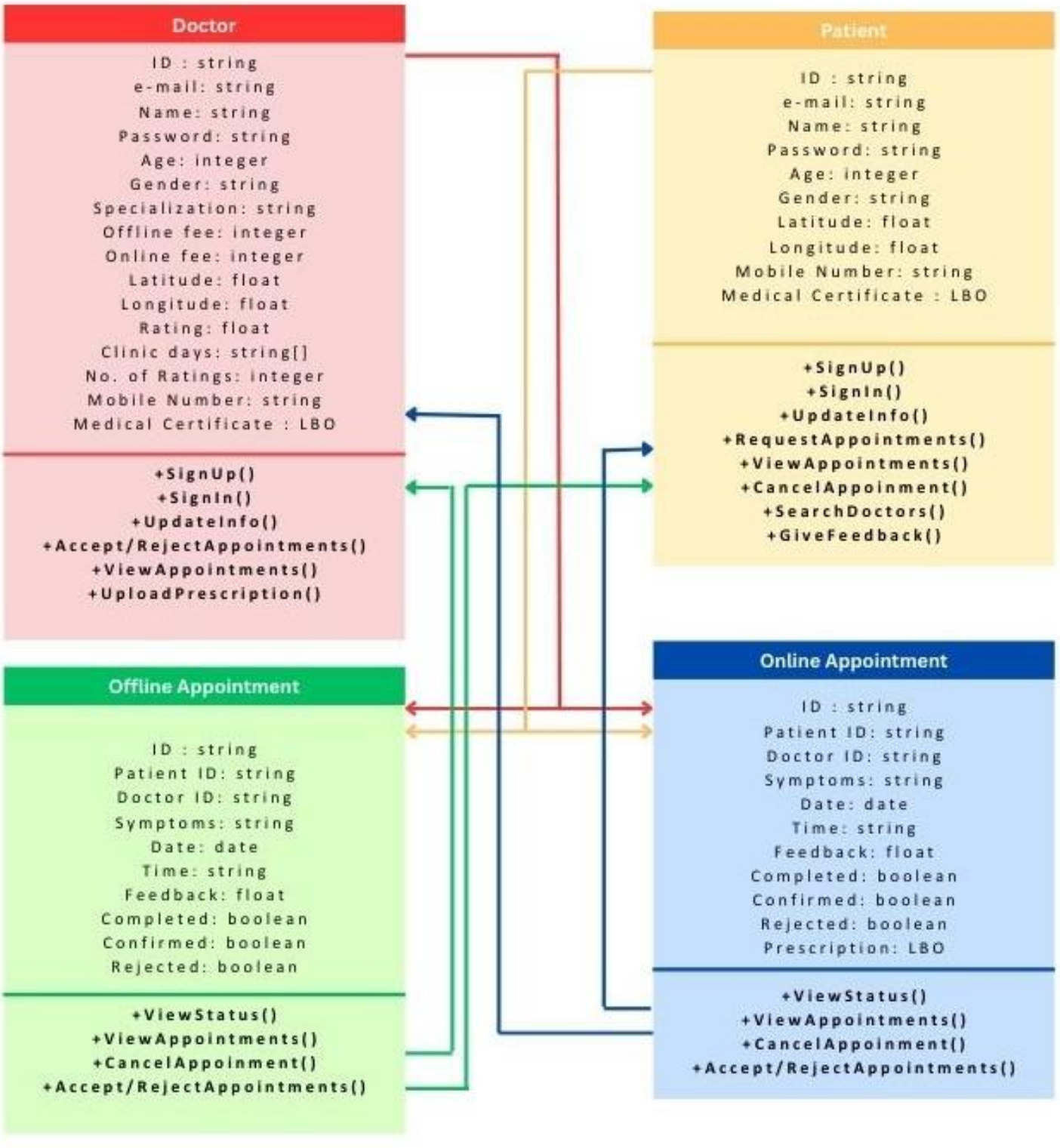
Column	Type	Description	Comments
ID	string	Patient ID	Unique auto-generated
e-mail	string	Unique email ID	Unique
Name	string	Patient's Name	Need not be unique
Password	string	Account Password	Min. 8 characters, Need not be unique
Age	integer	Patient's age	Input from patient
Gender	string	Doctor's Gender	Male/Female
Latitude	float	Latitude of Patient's location	Auto-generated from patient's location
Longitude	float	Longitude of Patient's location	Auto-generated from patient's location
Mobile Number	string	Patient's Mobile number	Not visible to anyone else

Class : Offline Appointment

Column	Type	Description	Comments
ID	string	Appointment ID	Unique auto-generated
Patient ID	string	ID of patient	Foreign key : Reference for Patient table
Doctor ID	string	ID of doctor	Foreign key : Reference for Doctor table
Symptoms	String	Symptoms of sickness	Input from patient applying for appointment
Date	Date	Date of appointment	Choice is given to patient to choose the date
Time	String	Time slot for appointment	Provided by the doctor on confirmation
Feedback	float	Feedback for the doctor	Given by patient after the appointment
Completed	Boolean	status	True if Appointment is conducted else false
Confirmed	Boolean	status	True if appointment is confirmed by doctor
Rejected	Boolean	status	True if appointment is rejected by the doctor

Class : Online Appointment

Column	Type	Description	Comments
ID	string	Appointment ID	Unique auto-generated
Patient ID	string	ID of patient	Foreign key : Reference for Patient table
Doctor ID	string	ID of doctor	Foreign key : Reference for Doctor table
Symptoms	String	Symptoms of sickness	Input from patient applying for appointment
Date	Date	Date of appointment	Choice is given to patient to choose the date
Time	String	Time slot for appointment	Provided by the doctor on confirmation
Feedback	float	Feedback for the doctor	Given by patient after the appointment
Completed	Boolean	status	True if Appointment is conducted else false
Confirmed	Boolean	status	True if appointment is confirmed by doctor
Rejected	Boolean	status	True if appointment is rejected by the doctor
Prescription	LBO	Prescription	Uploaded by doctor after online meeting



Class Diagram

2.4 Operating Environment

The Online Medical Consultation System is a website and shall operate in all famous modern-day browsers like Google Chrome, Mozilla Firefox ,Microsoft Edge and Safari as well. It is also supported in almost all OS which includes Windows, Linux, and MacOS.

2.5 Design and Implementation Constraints

The information of all doctor, patients and appointments must be stored in a database that is accessible by the website. User is expected to remember their Email and password for signing in to the website. After hosting, the users may access from any computer that has Internet browsing capabilities and an Internet connection. Data-fetching library like axios is a necessary third-party product for the functionality of the website.

2.6 User Documentation

The information of all doctor will be accompanied by a comprehensive user documentation package to assist users in installing, configuring, and utilizing the software effectively. The user documentation package will include the following materials:

User manual: User manual including step-by-step instructions will be provided to guide users through installing and using the software.

Quick reference guide: A quick reference guide will be provided to help users perform common tasks, such as searching for doctors, requesting for appointments for patients and accepting/ rejecting appointments for doctor.

Relevant technology documentation: The user documentation package will also include links to relevant technical documentation, such as React Native documentation.

2.7 Assumption and Dependencies

- The code written is based on ES6 standards and has features which are not compatible with another version of ECMAScript. That's why browser not compatible with ES6 standards like Internet Explorer is unlikely to support our website.
- Geolocation API is an essential dependency for our website to function properly. Fortunately, most modern-day browser like Chrome, Firefox, Safari etc. support this API. However certain old or less common browser may not support the Geolocation API or may require additional permission from the user.
- The front-end and back-end has certain type dependencies to ensure that right type of data reaches the database. Altering this dependency may lead to malfunctioning of the website.

3. External Interface Requirements

3.1 User Interfaces:

Welcome Page : It provides two choices to the user :

- **Sign in** : The user can sign in by providing his email ID and password.
- **Sign Up** : A first-time user should sign up and provide his details. The next time he visits the site, he can sign in using his credentials.

Sign Up page : The sign-up page asks the user to enter name, email address and also asks to enter his password twice to eliminate the chances of a typo. He is also asked what type of profile he wants to create, i.e. Doctor or Patient.

- For the patient type profile, the user is asked to enter mobile number, age and gender . He is also given an option to upload a photo to be shown as the display picture for his account.

- For the doctor type profile, the doctor is asked to enter mobile number, age, specialization, gender, clinic name and years of experience. He is also asked to mark the days on which he is available for consultation. In addition to all this, he has to provide his address and consultation fee.

Home Page for patient :

- It contains options for choosing 16 different fields of medical science.
- The patient is expected to select the field of the doctor he wants to consult.
- On selecting the field, a new page for choosing the doctor opens up.

Doctor Booking Page :

- This page contains the list of available doctors for the selected field.
- The list is sorted based on proximity to the patient, closest first.
- Each div containing a doctor also specifies the clinic, the years of experience, the days on which the doctor is available and the consultation fee.
- On selecting a doctor, an appointment window opens up on the page.

Appointment Window :

- This window gives a patient the option to choose the date of consultation based on the available dates.
- It also provides a box where the patient can write the symptoms and the problems he is experiencing.
- The box also informs the patient about the location of the clinic and the consultation fee.
- When the patient fills all the details and clicks the “Request Appointment” button, an appointment request is sent to the patient.

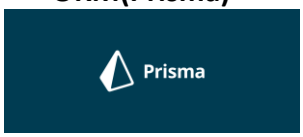
Doctor's Homepage :
The doctor's homepage displays a list of appointments with patient name, symptoms and date. The doctor is expected to enter the time of the appointment if he confirms it, or else reject it. The confirmed and rejected appointments are also displayed in the info table on the homepage.

3.2 Hardware Interfaces:

OMCS should support various input devices such as keyboards, mouse, touchscreens and touchpads for user interaction. It has compatibility with different display resolutions and aspect ratios to ensure optimal viewing experiences across devices (implemented for PCs and laptops till now)

3.3 Software Interfaces:

OMCS has integration with database systems to access and update patient and doctor info and all the history of appointments done and treatment plans. It has integration with email messaging system to ensure virtual consultations between doctors and patient via online video conference.

Software	Description	Version
Back-End (Express &Node.js) 	Express is the framework used for writing the back-end as it provides robust architecture to create APIs and middleware.	4.18.3
Front-End (React) 	React is used for making a dynamic user-friendly website as components creations are fast-efficient using React.	18.2.0
Language (TypeScript) 	Typescript adds additional syntax to JavaScript to support a tighter integration with editor and efficient debugging process.	5.4
Database (PostgreSQL) 	SQL Database is always a better option than non-SQL database like MongoDB since it fixes the schema of a particular Table. PostgreSQL is used for data storage.	16.2
ORM(Prisma) 	Prisma is the most convenient widely used ORM.It is used in the project to communicate with the database.	5.11.0
Web Browser(Chrome) 	Our website is intensively tested on Google chrome. Although it is expected to work on Edge, Safari and other modern browsers.	123.0.6312.58-1

3.4 Communication Interfaces:

OMCS supports integration with secure email messaging platforms for asynchronous communication between doctors and patients, notifying them about scheduling of an appointment. It also notifies the patient if his appointment is accepted or rejected and if accepted, then he is also notified about the time of the appointment.

4. External Interface Requirements

4.1 Patient Features Overview:

Sign Up/Sign In: Signing in to an existing account user just needs to provide his/her email and password. Sign up is a two-step process required for creating an account on ConsultEase.

Step by Step Instruction:

- User provides **email, name and password** to initiate account creation. Email must be UNIQUE and password must be of minimum 8 letters.
- Next step involves providing other personal details like age, gender etc. Location is automatically detected upon granting permission to the web browser. No need to provide address manually making it convenient for the user.

Find Doctor: After logging in to the website the user can choose from various specialties of doctor based on their concern. The website renders a page listing all doctors of that specialization based on their clinic distance from the user. Also, the user has the facility to find doctor by their name using the search bar.

Step by Step Instruction:

- Select the button corresponding to the specialization of doctor.
- List of all doctors of that specialization is rendered. Choose from them
- Alternative option is to find a doctor by their name using the search bar .

Book Appointment: User can book appointment from the list of doctors by providing certain basic information. Upon clicking book consultation, a pop-up prompts the user to enter further details.

Step by Step Instruction:

- Click on the doctor of your choice to book an appointment.
- Choose a date based on the availability of doctor as shown on the screen.
- Also, you can provide certain symptoms that you are facing.
- Then you can request for an appointment from the doctor.

- Upon confirmation it will be shown on the dashboard.

View Appointment : Under the appointment section from the dashboard, you can view all the past appointments and the information regarding that appointment will also be shown whether it is pending or completed or even rejected by the doctor.

Step by Step Instruction:

- From the sidebar click on “Appointments”
- All the appointments will be rendered and you can view them.

View/Modify Info: User can update all your details EXCEPT your Email ID under the profile tab from the Sidebar. All details will be updated upon user request.

Step by Step Instruction:

- From the Sidebar go to the profile section to view your information.
- You can modify the following details:-
    - Name
    - Password
    - Mobile
    - Age
    - Gender
    - Address
- To update you address just click on the update address button and your address will automatically be updated based on your presence location.

Give feedback: Under the give feedback action user can give rating to doctors which is a key feature of each doctor as it is shown in their profile and also user can give descriptive feedback to the doctor if they wish to.

Step by Step Instruction:

- From the sidebar click on “Feedback”
- All the completed appointments will be rendered on the screen.
- You can give rating to the doctor and feedback by clicking on the button “Give Feedback”.

Cancel Appointment: In view appointment section, user can cancel appointments which are not yet confirmed. Once confirmed by the doctor the appointment cannot be canceled.

Step by Step Instruction:

- From the sidebar click on “Appointments”.
- All appointments will be rendered on the screen.
- You will find the “Action” column with a cancel button for appointments not yet confirmed.
- Click on the cancel button to cancel the appointment.

Email Notifications: Upon confirmation of appointment by the doctor an Email will be sent to the user regarding appointment details like time slot etc.

Profile Photo: User can add their profile picture while signing in and they can also update their profile picture in the “Profile” tab from the sidebar.

4.2 Doctor Features Overview:

Sign Up/Sign In: Signing in to an existing account user just needs to provide his/her email and password. Sign up is a two-step process required for creating an account on ConsultEase.

Step by Step Instruction:

- User provides **email, name and password** to initiate account creation. Email must be UNIQUE and password must be of minimum 8 letters.
- Next step involves providing other personal details like age, gender etc. Location is automatically detected upon granting permission to the web browser. No need to provide address manually making it convenient for the user. In this page user need to fill in all the following details:
    - Mobile number
    - Age
    - Gender
    - Address
    - Clinic Name
    - Year of Experience
    - Consultation Fee
    - Clinic Days
- Address will be automatically generated upon granting permission to the browser.
- Clinic Days can be selected from the button given for every day of a week.

View Appointment : Doctor can view all the appointments booked so far by patients in the home page. Also, under the “Appointments” section from the sidebar user can view all past appointments as well.

Step by Step Instruction:

- Upon logging in to the account user can view all the present appointments in the dashboard.
- Go to the Appointment Section to view all present as well as past appointments.

Confirm/Cancel Appointment : Doctor can confirm or reject any appointment in the dashboard. Two buttons will be provided to the user to either confirm or reject and action is irreversible.

Step by Step Instruction:

- In the home page, from the list of booked appointments either confirm or reject an appointment by clicking on the button provided.
- The action is irreversible and will be displayed both to the respective patient and the doctor.

View/Modify Info: User can update all your details EXCEPT your Email ID under the profile tab from the Sidebar. All details will be updated upon user request.

Step by Step Instruction:

- From the Sidebar go to the profile section to view your information.
- You can modify the following details:-
    - Name
    - Password
    - Mobile
    - Age
    - Gender
    - Address
    - Clinic Name
    - Year of Experience
    - Consultation Fee
    - Clinic Days
- To update you address just click on the update address button and your address will automatically be updated based on your presence location.

Upload Prescription : Doctor can provide a prescription for online appointments after consultation with patient. The prescription will be visible to the patient under the online appointments section.

Step by Step Instruction:

- Go to “Online Appointment” section from the sidebar.
- Upload prescription button will be available for completed appointments.

Email Notifications: Upon receiving an appointment from a patient an Email will be sent to the user regarding appointment details like patient name date of appointment etc.

Profile Photo: User can add their profile picture while signing in and they can also update their profile picture in the “Profile” tab from the sidebar.

Payment Gateway: User can pay for their online appointments to confirm. This is simulated through a mock payment gateway to ensure that fees are paid.

5. Other Non-Functional Requirements

5.1 Performance Requirements:

The system should be capable of handling peak user loads during busy periods, such as pandemics or public health emergencies. Response times for critical operations should meet predefined benchmarks, with minimal latency to ensure a responsive user experience. OMCS should allow seamless appointment booking for patients.

5.2 Safety Requirements:

The system should ensure all user data is encrypted using industry-standard encryption to protect sensitive information from unauthorized access. The system should implement access controls to restrict user access to data based on their roles and permissions. For example – Medical history of patient should not be publicly visible to other users.

5.3 Security Requirements:

The system should implement secure coding practices to mitigate common security vulnerabilities such as SQL injection. User authentication mechanisms should support strong password policies, including password complexity requirements. Access to sensitive data and system resources should be logged and audited to track user activities.

5.4 Software Quality Attributions:

Compatibility testing should be performed across different web browsers, operating systems, and devices to ensure consistent performance and functionality. The system's codebase should adhere to coding standards and best practices to facilitate code review, maintenance, and collaboration among developers. Automated testing procedures, including unit tests, integration tests, and regression tests, should be implemented to validate the system's functionality and stability.

5.5 Business Rules:

Compliance with medical ethics and professional standards, such as the Hippocratic Oath and professional codes of conduct, should be enforced to maintain trust and integrity in the medical profession. Doctor must upload their medical certificate at the time of profile creation for proof. Patient consent should be obtained before sharing their medical information with third parties or conducting medical procedures. Appointment scheduling policies should prioritize urgent cases and accommodate patients' preferences for specific dates, times, and healthcare providers whenever possible. Confidentiality agreements should be in place to protect sensitive information shared between healthcare providers, patients, and other authorized parties.