Doctor Booking System

SDD Major Project

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The current revision of the project is available at:

Client Module https://samuelgresham12.github.io/Doctor-Booking-System/login.html
Reception Module https://samuelgresham12.github.io/Doctor-Booking-System/reception.html

Documentation, such as the Gantt Chart, can be found at:

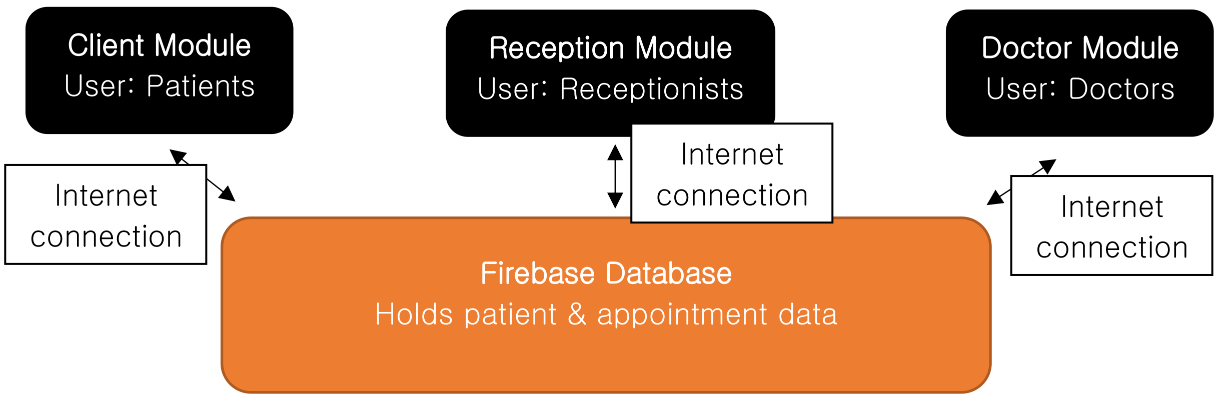
https://github.com/samuelgresham12/Doctor-Booking-System/tree/master/DOCUMENTATION

Defining the Problem – Project Brief

'Doctor Booking System' is aimed to streamline and simplify the process of:

(i) Booking Creation,
(ii) Check In and
(iii) Patient Consultation

in the context of a doctor's office/GP Clinic. It will consist of three modules, which will all interact with a centralised database (Google Firebase), which will hold all patient and appointment data. The general structure of the program is as follows:



A general overview of the functionality of each module is provided below:

1. The **Client Module** allows patients to manage their personal data and create/cancel bookings. A display of upcoming bookings is also provided.
2. The **Reception Module** allows receptionists to view the upcoming bookings on a certain day, as well as check patients in and create over-the-phone bookings.
3. The **Doctor Module** allows the doctors and medical professionals to see past diagnoses and treatments. The doctor can then assess the patient and update the information on the database as necessary.

To generalise, the project will concern itself with the creation, storage and retrieval of patient information from a database, as well as the manipulation of that data.

A modular approach will be used to increase ease of use, as well as to decrease the likelihood that sensitive data is accessed by those who do not require it. Despite this, security will be a considerable issue due to the lack of a secure backend.

Design Specifications

Objectives

The following objectives will be met:

1. Functional modules which are appropriate for the relevant users
2. Appropriate user interface design – easy to use
3. Efficient use of centralised database – minimal reads reduces loading time

Developer Design Specifications

The following design specifications have been set to create a standard development framework:

1. **Data Types** – mostly strings will be used (patient names, comments etc...), but selected integers will be used for things such as times etc...

2. **Data Structures** – the project will store data primarily in objects, with some embedded arrays. For example, each patient is an object, with attributes such as name, Medicare number etc…
3. **Algorithms** – the project will use many algorithms and routines in order to achieve its purpose. These will include sort routines, search routines and general access routines (accessing data from database, queries etc…)
4. **Variables** – many variables are to be created in this project. The naming of these variables should be descriptive of their purpose. Temporary variables, such as incrementors, should be given names that make this obvious (i, temp etc…).
5. **Design Approach** – the project will be a mix of agile and prototyping approach. Prototypes with be consistently made and reviewed. Agile methodologies such as an "ad-hoc" mentality will also be adopted.
6. **Quality Assurance** – it is important that the final software is reliable and easy to use. For this reason, QA will be performed to ensure that the software operates correctly in a range of use cases. QA will be performed using test data and load testing, as well as aesthetic and UX refinement.
7. **Modelling** – a range of modelling tools will be used, including:
    a. Storyboards
    b. Screen Designs
    c. Data Dictionaries
    d. IPO Charts
    e. Data Flow Diagrams
    f. Structure Charts
    g. System Flowcharts
8. **Documentation** – documentation is very important for this program, since users from many backgrounds and abilities will be using it. Such, proper documentation in the form of an online how-to guide will be created.

User Design Specifications

1. All module interfaces are to be made through the Bootstrap CSS library for consistency
2. Consistent use of colour will be used:
    a. Red to signify a significant or critical action (i.e. deleting a booking)
    b. Green to signify a commonly used action (i.e. logging in)
    c. Grey to signify a less commonly used action (i.e. creating an account)
    d. Yellow to signify a dangerous but reversable action (i.e. logging out)
    e. Blue to signify a harmless, reversable action (i.e. updating personal details)
3. The client module is to be simple and easy to navigate, as to make it as easy as possible for a variety of people to use.
4. Testing is to be done to ensure ease of use and functionality.
5. Security will be developed to ensure that sensitive patient data is not vulnerable.
6. See *social and ethical issues* for accessible interface information.

Interface/Interaction design

The interface is to be made easy to use and functional by:

1. Use of consistent elements such as colour (*see above*)
2. Use of appropriate input types (drop-down boxes, input boxes, date etc…) to make data entry easier, and also to restrict incorrect data input.
3. Grouping related elements together (such as the 'personal data', 'upcoming bookings' and 'make a booking' columns in the client module) to make use more ergonomic.
4. Creating a user guide, to help users navigate each module.

5. Identification and testing with relevant audiences. This project will engage with a wide audience, so testing must be done with a wide audience.
6. Appropriate feedback, such as dialogue boxes, colours and data changes should be made quickly and clearly, as to make the program more responsive and easy to use.

Social and Ethical Issues

Quite obviously, the management of sensitive patient data results in plentiful social and ethical issues. Patients will not want to use the system unless they are sure that their data is being stored responsibly and securely.

This project aims to reduce social/ethical issues relating to the **sensitivity of patient data/privacy** by:

(1) Using the more secure *collection*.doc().get() firebase method, rather than solely relying on the *collection*.get().then(()=>{//}) method. This essentially means that specific patient records are sent rather than the entire database, making the database more secure. For example, when patient data is loaded, the patient cannot access other patient's data.
(2) Using the encrypting JavaScript methods to store sensitive passwords. This means that even if passwords are fetched from the database, they are in a 64 bit encoded form, making password breaches harder. Despite this, it is still possible for users to decrypt passwords if they have the knowledge.
(3) Storing patient data using an anonymous, random primary keys. This means that someone could not just run a command like db.collection("patients").doc(//patient name).get(), rather, they would have to find the primary key, which is considerably more difficult. This random key is also assigned by firebase, and so the computer never has the keys stored. Despite this, it is still technically possible to access patient data, given a 'brute force' approach.

The project also considers **ease of use** by:

(1) Modularising the program to ensure that patient interfacing modules are simple and streamlined. For example, patients are only given a selection of options that they can use.
(2) Using consistent UI elements (see *user design specifications* above).

The project considers **availability** by making the application web-based, and such centrally accessible. This means the only software necessary to run the system is a web browser. This is a big issue for a medical program, as medical institutions should be aware of how accessible their services are to the general public, who may not have the expertise to run complicated software.

The project considers **ergonomics** by grouping similar elements together to reduce wrist strain when navigating pages. This will be beneficial, since receptionists may be using this software for hours on end. The grouping of these components will reduce the impacts of RSI (repetitive strain injuries), producing a safer working environment.

Inclusivity is considered by making language clear and easy to read, and using large fonts for important elements (visual disabilities etc…). TTS (text to speech) software could also be employed to make the service accessible to those with visual disabilities.

Needs of the Client

The client has the following needs:

(1) Allow patients to make bookings remotely, without interacting with a member of staff
(2) Track bookings for a given day to determine when doctors are required
(3) Hold patient data such as:
  a. Healthcare data (Medicare, private health)
  b. Patient data (name, sex etc…)
  c. Health data (doctor's notes, medications etc…)
(4) Manage payment and financial tracking
(5) Secure, reliable and fast storage of patient data
(6) Attractive interface for both clients and members of staff

This system, whilst not crucial to the operation of a healthcare facility, is a central part of the patient experience. Such, it can be considered an integral and critical piece of software. For this reason, it is a worthwhile investment for the company.

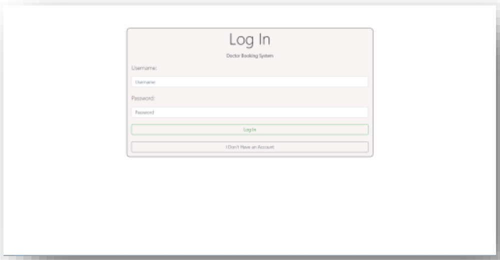
The system offers capabilities for expansion, making it future-proof. This means that the system can be adapted to offer extra functionality in the future. An example of this would be changing the times when which the doctors are available, to allow for extended operating hours.

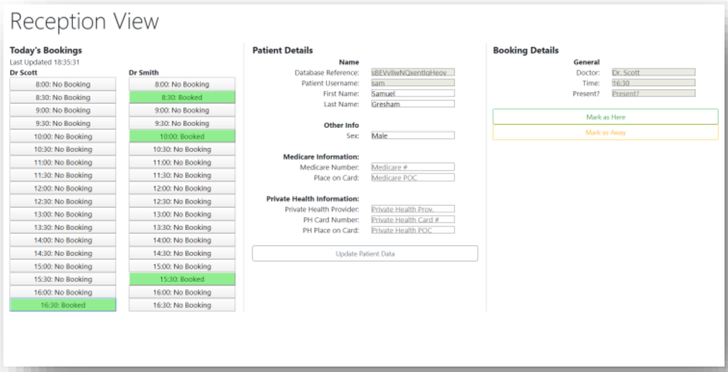
For the above reasons, this software will satisfy the current needs of the client, and will be expandable for any future needs.

Unfortunately, there are some limitations to the Doctor Booking System that may not meet the needs of the client, a summary of which is below:

- It is difficult to add and remove doctors without editing source code
- There are some stability issues when internet connection is slow (optimisation issues)

Images of the Software




Reception View

Today's Bookings
Last Updated 18:35:31

Dr Scott	Dr Smith
8:00: No Booking	8:00: No Booking
8:30: No Booking	8:30: Booked
9:00: No Booking	9:00: No Booking
9:30: No Booking	9:30: No Booking
10:00: No Booking	10:00: Booked
10:30: No Booking	10:30: No Booking
11:00: No Booking	11:00: No Booking
11:30: No Booking	11:30: No Booking
12:00: No Booking	12:00: No Booking
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14:00: No Booking	14:00: No Booking
14:30: No Booking	14:30: No Booking
15:00: No Booking	15:00: No Booking
15:30: No Booking	15:30: Booked
16:00: No Booking	16:00: No Booking
16:30: Booked	16:30: No Booking

Patient Details

Name
Database Reference: sBEVvllwNQxentlqHeov
Patient Username: sam
First Name: Samuel
Last Name: Gresham

Other Info
Sex: Male

Medicare Information:
Medicare Number: Medicare #
Place on Card: Medicare POC

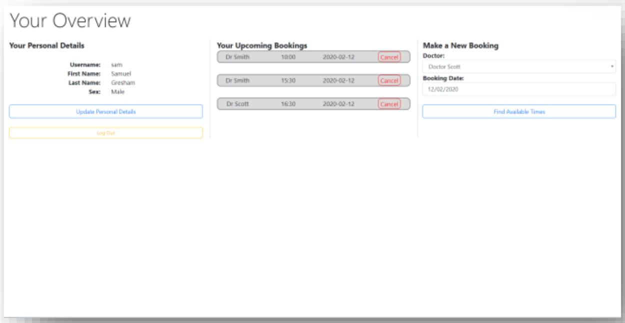
Private Health Information:
Private Health Provider: Private Health Prov.
PH Card Number: Private Health Card #
PH Place on Card: Private Health POC

Update Patient Data

Booking Details

General
Doctor: Dr. Scott
Time: 16:30
Present?: Present?

Mark as Here
Mark as Away


Your Overview

Your Personal Details
Username: sam
First Name: Samuel
Last Name: Gresham
Sex: Male

Update Personal Details
Log Out

Your Upcoming Bookings

Dr Smith	10:00	2020-02-12	Cancel
Dr Smith	15:30	2020-02-12	Cancel
Dr Scott	16:30	2020-02-12	Cancel

Make a New Booking
Doctor: Doctor Scott
Booking Date: 12/02/2020

Find Available Times