A Project Report

on

Book My Vaccine

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Abstract

Book My Vaccine is utility software which helps the administrator, vaccination centers and users to schedule, organize, track and monitor mass vaccination. With the rise of number of infections and diseases, getting vaccinated has become important decision in order to maintain health. Whereas, government, administrations and vaccination center have lots of challenges for mass vaccination of people from vaccine procurement to vaccine transportation, management and performing mass vaccination. This type of challenges can be easily faced by administration, vaccination center and patients when there is an effective vaccination management software. Vaccination Management Software provides effective solution for administrations, vaccination center and patients from vaccination management to vaccination appointment. In this type of software, administrations can allocate, track and manage vaccine to vaccination center. Vaccination center can view, prepare and manage the incoming patients for vaccination. Whereas, the users can schedule and make an appointment for vaccination in the desired centers. To make this type of Book My Vaccine, we need a robust technology that can meet the requirement of all the three party i.e., administrations, vaccination center and patients. In the backend, Django framework is used, and on the frontend side, Bootstrap framework can be utilized in order to make the site responsive and user friendly. On the database side, PostgreSQL is used to handle the complex data generated from the system. As a result, we shall expect a system like Book My Vaccine that will contain three modules i.e., admin, center and patients. This type of system will help each user involved in different activities of vaccination in order to track, manage, schedule and get vaccinated against various infections. Book My Vaccine is a utility software that is intended to help government, local authorities and common people for mass vaccination drive. This type of system can be used for any type of vaccination and is intended to make the vaccination drive more effective from government level to user level.

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CHAPTER-1
Introduction

1.1 Introduction

Vaccination is the administration of a vaccine to help the immune system develop immunity from a disease. Vaccines contain a microorganism or virus in a weakened, live or killed state, or proteins or toxins from the organism. In stimulating the body's adaptive immunity, they help prevent sickness from an infectious disease. When a sufficiently large percentage of a population has been vaccinated, herd immunity results. Herd immunity protects those who may be immunocompromised and cannot get a vaccine because even a weakened version would harm them. The effectiveness of vaccination has been widely studied and verified. Vaccination is the most effective method of preventing infectious diseases. [1]

Vaccination Management refers to the process of vaccine management starting from vaccine procurement to vaccine allocation to center to providing vaccine to the end user. In this type of mass vaccination, government, various local health authorities, agents and patients are involved. To effectively management all these involved parties there must be a proper system in order to track, monitor and manage different entities. This is where, Book My Vaccine comes into effect.

Book My Vaccine is utility software which helps the administrator, vaccination centers and users to schedule, organize, track and monitor mass vaccination. With the rise of number of infections and diseases, getting vaccinated has become important decision in order to maintain health. Whereas, government, administrations and vaccination center have lots of challenges for mass vaccination of people from vaccine procurement to vaccine transportation, management and performing mass vaccination. This type of challenges can be easily faced by administration, vaccination center and patients when there is an effective vaccination management software. Vaccination Management Software provides effective solution for administrations, vaccination center and patients from vaccination management to vaccination appointment. In this type of software, administrations can allocate, track and manage vaccine to vaccination center. Vaccination center can view, prepare and manage the incoming patients for vaccination. Whereas, the users can schedule and make an appointment for vaccination in the desired centers.

1.2 Formulation of Problem

We're protected from infectious disease by our immune system, which destroys disease-causing germs – also known as pathogens – when they invade the body. If our immune system isn't quick or strong enough to prevent pathogens taking hold, then we get ill. We use vaccines to stop this from happening. A vaccine provides a controlled exposure to a pathogen, training and strengthening the immune system so it can fight that disease quickly and effectively in future. By imitating an infection, the vaccine protects us against the real thing.

With the rise in a number of infections and diseases, getting vaccinated has become very important. Government, health authorities and various organizations promotes and aware people to get vaccinated. Now, in order to carry out large vaccination drive, there comes a problem of vaccination management by government, vaccination center, health agents. In order to track, monitor and manage each phase of vaccination, there must be a type of software which can address the problems of each party involved in vaccination. This is where Book My Vaccine comes into picture.

1.2.1 Tools and Technology Used

To make this type of Book My Vaccine, we need a robust technology that can meet the requirement of all the three party i.e., administrations, vaccination center and patients. In the backend, Django framework is used, and on the frontend side, Bootstrap framework can be utilized in order to make the site responsive and user friendly. On the database side, PostgreSQL is used to handle the complex data generated from the system.

CHAPTER-2

Literature Survey

2.1 Current Trends in Vaccination Management Software

Regarding vaccination management, each government, health authorities and health agents have different approaches for mass vaccination. Some governments in poorly developed countries used manual process for mass vaccination drive. Whereas in highly developed nations, government has their own custom system for mass vaccination. Likewise, local health authorities may/may not have their custom software in order to manage vaccination drive digitally.

2.2 Challenges Vaccination Management Software

Regarding mass vaccination, there is always a challenge in tracking, monitoring, scheduling and reporting the vaccination information by the administration and health agents. Whereas, giving a user choice to choose vaccine for different disease, and allocating them slots in vaccination center can invite lots of architectural challenges in software. There are lots of software publicly available which can handle vaccine type for single infections. Building a software which can handle vaccination drive for multiple infections/disease and allowing admins, health agents and patients to perform the desired activities is really big challenges but it solves lots of problems for admins, heath agents and common user to stay in single platform and take part in multiple vaccination drives.

2.3 Proposed Solution

This Book My Vaccine consists of four main modules i.e., Admin, Agents, Vaccination Center, Patients. The admin will allocate vaccine to the center as well as assign agents to different centers along with their role and permissions. The health agents will be present in the vaccination center to take part in vaccination drive. They will be responsible to give vaccine to the patients and update the necessary information on the system. Patients can choose the vaccine type and book a slot in the desired vaccination center. Once, the vaccination is completed, patients can download the vaccination certification from the portal.
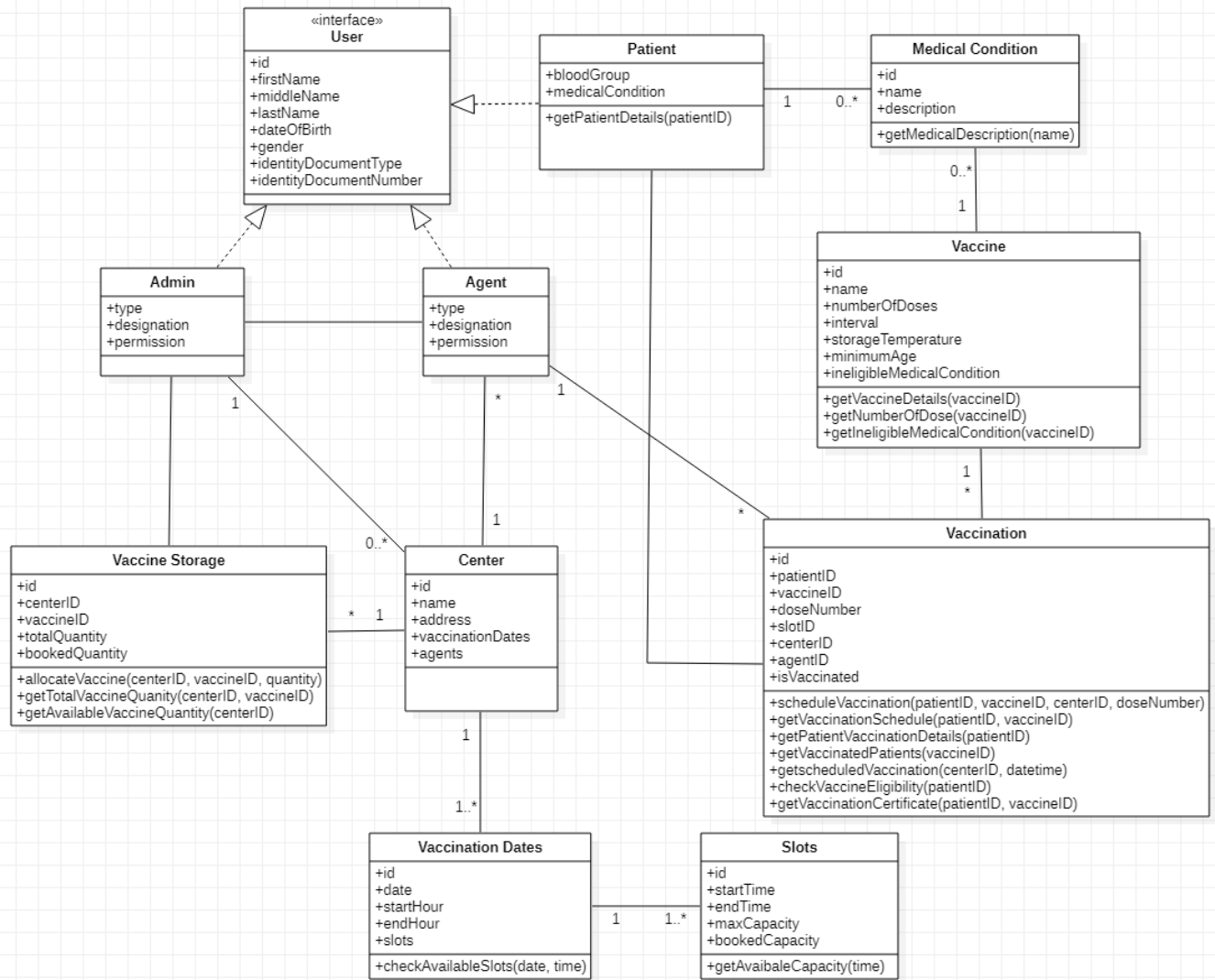
Figure 1: Class Diagram of Book My Vaccine

Chapter 3 – Functionality/ Working of the Project

3.1 System Development Environment

The system development environment for implementing this project is explained below.

SN	Topics	Tools Used
1	Programming Language	Python, JavaScript
2	Backend Framework	Django
3	Frontend Framework	Bootstrap
4	Database	PostgreSQL
5	Deployment	Heroku

Table No. 1: System Development Environment

3.2 Architecture Description

3.2.1 Authentication System

A User model has to be created and it should have following model fields.

SN	Model Field Name	Model Field Type	Description
1	Email	Email Field	For storing email address of the user.
2	First Name	Char Field	For storing the first name of the user.
3	Middle Name	Char Field	For storing the middle name of the user.
4	Last Name	Char Field	For storing the last name of the user.

5	Date of Birth	Date Field	For storing the date of birth of the user
6	Gender	Select Option	User selects between Male, Female or Transgender
7	Identity Document Type	Select Option	User selects the document type. Option are Voter ID, Passport, Citizenship Number
8	Identity Document Number	Char Field	User provides the document number of chosen document type.
9	Date Joined	Date Time Field	Automatic Date Time field whose value is the date time of when the user creates their account.
10	Last Updated	Date Time Field	Automatic Date Time field whose value is the date time of when the user last updates their profile.

Table No. 2: User Model Description

There shall be 3 different type of user profile which has to be created and they are: Admin, Agent and Patients.

a. Admin

The admin profile is for that type of user who are going to manage the entire portal. They will be mainly responsible for vaccination center creation, agent profile creation, assigning agents to vaccination center, allocating vaccination quantity. This admin profile shall have following model fields.

SN	Model Field Name	Model Field Type	Description
1	User	Foreign Key	This field will create one to many relationships between user and admin model.
2	Type	Select Option	A select field which has the following options: vaccine administrator, center administrator, agent administrator.
3	Permissions	-	Permissions related to performing CRUD operations for center, agent, vaccine and its quantity.

Table No. 3: Admin Model Description

b. Agent

The agent profile shall be created by the administrator. It will have following model fields.

SN	Model Field Name	Model Field Type	Description
1	User	Foreign Key	This field will create one to many relationships between user and agent model.
2	Type	Select Option	A select field which has the following options: Doctor, Nurse, Helper
3	Permissions	CharField	Permissions related to who can view, edit and modify patient data and issue vaccination certificate.

Table No. 4: Agent Model Description

c. Patient

It is the default profile type when a user signs up in the system. Patient will update their medical condition and their apply for vaccination by choosing the center and vaccination slots. Once their vaccination is completed, they can download their vaccination certificate from their portal. The patient profile will have following

model fields.

SN	Model Field Name	Model Field Type	Description
1	User	Foreign Key	This field will create one to many relationships between user and patient model.
2	Blood Group	Char Field	For storing patient blood group.
3	Medical Record	-	This model field will establish many-to-many relationships between patient and medical condition model.

Table No. 5: Patient Model Description

3.2.2 Vaccination Management

Three models shall be created that deal with the vaccination management process and they are Vaccine, Center and Storage model.

1. Vaccine

This model will carry all the necessary information related to the vaccine like name of vaccine, number of doses, interval between two doses, storage Temperature, minimum age to vaccinate, and ineligible medical conditions. This type of data will be used to check for patient vaccination booking process.

2. Center

The center model will handle the vaccination center data. It will include the information like name, address of center, vaccination dates of the center and the agents that are deployed in that vaccination center.

3. Vaccination Storage

Each center will have vaccination storage object where the quantity of specific vaccines will be stored. This vaccination storage model will be handled by the admin. The admin will update and modify the vaccination storage quantity of each center.

Therefore, in the vaccination portal, admin will create vaccine profile and then it will create some vaccination center. Each vaccination center shall have vaccination storage system, and it will be handled by the admin. While booking for any vaccination slot, first of all, it will be checked that how much vaccine is available in the vaccine storage of particular vaccine center and based on that vaccination process will be continued at the patient end.

3.2.3 Vaccination Booking

For the vaccination booking, there will be four models which will be used for the vaccination booking by the patient. These models are center, vaccination, vaccination dates and slots:

1. Center

When the patient starts the process for booking the vaccination slot, he/she first have

to choose the vaccine type and then center where they want to get vaccinated. Once the center is chosen, then it will be checked whether the vaccine of that type is available in that center or not. Based on that, patient will be redirected to next page.

2. Vaccination Dates

Once the patient chooses the vaccine type and vaccination center, they will be prompted to choose given dates. These vaccination dates will be created by the agents who will be deployed to that vaccination center.

3. Slots

Once the center and vaccination date has been chosen for a particular vaccination center, then patients will have to choose one slot for vaccination. These slots are usually time interval of 15 to 20 min. These slots will be created by the agents of that vaccination center and once the slot is chosen, vaccination booking process wrapped up.

4. Vaccination

There will be one model named vaccination. This vaccination model will carry out all the information related to vaccination booking. It includes model fields like patient id, center id, vaccine id, dose number, slot id and many more.

3.3 Views

3.4.1 Authentication System

There will be following views for the authentication system.

1. Signup View – When the user visits the site, he/she will be given an option for signup. By default, every user will be of patient profile. For every patient profile, medical status object shall be created. The administrator profile will be created by site administrator and agents' profile will be created by administrator.
2. Verify Email View – This view will handle the email verification of the user.
3. Login View – This view will handle the login process of the user.
4. Logout View – This view will handle the logout process of the user.
5. Profile View – This view will handle to view the profile of the user.
6. Update Profile View – Using this view, user can update their personal information.
7. Change Password View – This view will handle the password changing feature.
8. Reset Password View – Using this view, user can reset the password by sending link to the email.

3.4.2 Vaccination Center Management

1. Center Create View – Using this view, admin can create a new vaccination center. Every time a new center is created, a new storage corresponding to that center shall be created.
2. Center Update View – Using this view, admin can update the information of vaccination center.
3. Center List View – Using this view, admin can see the list of all the centers and manage those centers.
4. Center Details View – Using this view, admin can see the details of that center. Also, additional information like vaccine, storage of that center shall be passed to the template.
5. Center Delete View – Using this view, admin can delete the center.
6. Storage Update View – Using this view, admin can update the storage status of vaccine of particular center.

3.4.3 Medical Condition Management

1. Medical Condition Update View – Using this view, patient can select their medical condition. Those medical condition are only created by the admin. Patient just has to choose any of the medical condition if it is applicable.

3.4.4 Vaccine Management

1. Vaccine Create View – Using this view, admin can create new vaccine.
2. Vaccine Update View – Using this view, admin can update the information of the vaccine.
3. Vaccine List View – Using this view, admin can see all the vaccine list.
4. Vaccine Details View – Using this view, patient can view the information of the vaccine.
5. Delete Vaccine – Using the view, admin can delete the vaccine from the system.

3.4.5 Vaccination Management

1. Campaign Create View – Using this view, admin can create a new vaccination campaign.
2. Campaign Update View – Using this view, admin can update the vaccination campaign information.
3. Campaign List View – Using this view, admin can see the list of all the vaccination campaign.
4. Campaign Details View – Using this view, admin can see the details of a particular campaign.
5. Campaign Delete View – Using this view, admin can delete a particular campaign.
6. Slot Create View – Using this view, admin can create slots for vaccination campaign.
7. Slot Update View – Using this view, admin can update the slots. 8. Slot List View – Using this view, admin can get the list of all the slots of campaign.
8. Slot Delete View – Using this view, admin can delete the slots of particular vaccination campaign.

3.4.6   Vaccination Scheduling

1. Choose Vaccine View – Using this view, patient will choose a vaccine. On the backend side, vaccine eligibility of the patient will also be checked.

2. Choose Center View – Using this view, patient will choose their desired vaccination center. On the backend side, vaccine availability will also be checked.

3. Choose Slots View – Using this view, patient will choose their desired slot for vaccination.

4. Confirm Vaccination Scheduling View – Using this view, patient will be prompted to confirm for vaccination scheduling.

3.4.7 Dashboard View

1. Dashboard View for Patient – In this view, all the vaccination details of the patient will be displayed along with their related information.

2. Dashboard View for Agents – In this view, agents will get to know all the center which they have been assigned along with their role and designation.

3. Dashboard View for Admin – In this view, admin will get to know all the vaccination center, vaccination campaign, agents and many more related information.

3.4.8 Other Related Views for Agents, Admin

1. Center View for Agents – In this view, agents will get to know the particular center information in which they are assigned.

2. Patient View for Agents/Admin – In this view, agents/admin can see the patient information and their vaccination status.

3. Patient Details Update View – Using this view, agents/admin can update the patient information about their vaccination.

Chapter 4 – Results and Discussions

4.1. Expected Outcome

As a result of implementing this system, we shall expect a web application where patients can sign up and login to update their medical information and then apply for vaccination in their desired vaccination center at given date time. Whereas, admin shall login to their portal and then create some vaccination center and also create some agents of different types and deploy/assign them to the center. Admin shall create vaccine profile and allocate them to the center and allow for conduction vaccination drive at different date and time. Whereas, the health agents which are assigned to the different vaccination center shall have different roles and permissions and based on that, they will perform some actions.

4.2. Further Improvements

There will be always a space for code improvement, refactoring and optimizations. These should be carried out time to time by taking feedback from the end user who will use these sites. Moreover, in order to make the site more user friendly we can utilize some frontend libraries like React.js and backend framework like Django REST for creating APIs instead of maintaining the site using core Django concepts and using its template system to render the frontend. Likewise, once we create REST API using Django REST framework, we can use those APIs in mobile application. On the other side, more test cases can be written which can help to detect small bugs and errors withing the system. Similarly, Unit Testing, Integration Testing can be performed which will help to make the website more error free and bug-free.

Chapter 5 - Conclusion and Future Scope

5.1 Conclusion

This Book My Vaccine is intended help every hospital, local health authorities and government to carry out vaccination in seamless manner. It will help from vaccine procurement to vaccine administration to vaccine allocation to vaccinating patients at the end. It is an ideal software to carry out vaccination drive in complete digital mode. This software is intended to help administration, health agents and patient to carry out their vaccination drive and make their life healthier and safer. This software shall help every person involved in the vaccination drive to solve their problems and challenges effectively.

5.2 Future Scope

The future scope of the project shall be making REST API and utilizing those REST API in order to create a Single Page React.js App for more better user-friendly experience. Moreover, mobile app can also be created by utilizing those REST API.

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