# INDEX

# ABSTRACT

"COVID Bed Slot Management System" is designed to make the existing manual system automatic with the help of computerized equipment and full-edged computer software, fulfilling their requirements, so that their valuable data and information can be stored for a longer period with easy access and manipulation of the same.

The main objective of this application is to build an online bed slot booking platform, which allows a user to book a bed in a preferred hospital looking at the number of beds available.

The project Covid Bed Slot Booking System includes registration of patients, storing their details into the system, and also computerized billing for beds in the hospitals. The software has the facility to give a unique id(srfid) for every patient and stores the details of every patient automatically. It includes a facility to know the current status of availability of beds at each listed hospital.The Covid Bed Slot Booking System can be entered using a username and password. It is only accessible to admin. Only they can add data into the database. The data can be retrieved easily. The interface is very user-friendly. The data is well protected for personal use and makes the data processing very fast.

The Covid Bed Slot Booking System is powerful, flexible, and easy to use and is designed and developed to deliver real conceivable benefits to hospitals and patients.Bed Slot Booking System is designed for multispecialty hospitals, to cover a wide range of hospital administration and management processes. It is an integrated end-to-end Management System that provides relevant information across the hospital to support effective decision making for patient care, hospital administration and critical financial accounting, in a seamless flow.

Bed Slot Booking System is a software product suite designed to improve the quality and management of hospitals in the areas of clinical process analysis and activity-based costing. It enables you to develop your organization and improve its effectiveness and quality of work. Managing the key processes efficiently is critical to the success of the hospital and helps you manage your processes.

# CHAPTER 1

# INTRODUCTION

The coronavirus COVID-19 pandemic is the defining global health crisis of our time and the greatest challenge we have faced since World War Two. Since its emergence in Asia late last year, the virus has spread to every continent except Antarctica. Initially, the number of cases were few in number but as days went on, there are lakhs of cases being reported and thousands dying. When the cases were first reported, they were handled without complications with effective management and treatment. However, as the situation became wild, an efficient and a feasible management system gains its essentiality...

Bed Management in this pandemic has become an issue that almost all of the families of covid patients face. But by using the latest technology this problem can be solved, The main reason for this problem is hospitals not having a proper portal for managing beds. Our solution to this problem can be used to save many lives of covid patients. Therefore we have tried to address this problem with help of our project where the focus is to make sure that every covid patient gets a bed.

## 1.1 Background Study

The coronavirus COVID-19 pandemic is the defining global health crisis of our time and the greatest challenge we have faced since World War Two. Since its emergence in Asia late last year, the virus has spread to every continent except Antarctica. Initially, the number of cases were few in number but as days went on, there are lakhs of cases being reported and thousands dying. When the cases were first reported, they were handled without complications with effective management and treatment. However, as the situation became wild, an efficient and a feasible management system gains its essentiality.

Patients management is an integral component in the modern day healthcare management system. If proper records are kept in secure and safe place within the hospital helps healthcare professionals compare and contrast certain illnesses based on certain features. It can also be used for research purposes if guaranteed of security and privacy issues. A database taking records of the

covidpatients' information, their recovery timeline, their prescriptions would be undoubtedly useful. Thedatabase that is designed would smartly monitor the patient's health status by storing and updatingthe details of patients and their admit information, the symptoms, remedies, medications, treatment,and the discharge information. This system helps doctors to access the details, treat the patient veryeffectively and comes in handy to be one of the most efficient management tools.

## 1.2 Literature survey

West Bengal Integrated COVID Management System (WBICMS)

With rising trend of COVID-19 cases in West Bengal also, the demand for hospital beds has increased. The State Government has taken all possible efforts to tackle the situation proactively and many government and private hospitals have increased their bed capacity. The State government has also facilitated setting up of satellite facilities in hotels, guest houses and temporarily setting of hospitals near an existing private or government hospital. In addition to this, other aspects of combating the challenge like testing, vaccination, oxygen, ambulance, etc. are also being taken care of proactively.

WBICMS is an initiative of the Government of West Bengal to facilitate monitoring, coordination and management of various activities and functions discharged by various stakeholders in order to tackle this challenge proactively and provide real-time / up to date information related to vacancy and admission to different COVID facilities (Government / Private), ambulance, oxygen, across the state.

Efforts are also being made to provide information related to oxygen by tracking the production and distribution / provision of oxygen to hospitals.

This online portal provides crucial information like list and contact details of dedicated COVID-19 hospitals, availability of beds, & ambulance, etc. through various modes (Call, online and WhatsApp Chatbot).

Karnataka State COVID war room

This website provides various features

Covid War Room

i. Covid War Room Database Management.

ii. War Room Analytical Report

iii. War Room Uploading Reports

iv. Missing Reports


Citizen Reports

• Health Survey Data Entry Progress Reports

This report shows the data entry progress report – District, Assembly constituency wise & part wise.

• District Wise And Selfies Report

This report shows the number of Person in active quarantine, Number of HQ Person Visited by Staff and Number of Selfies sent by Citizen

• Home Quarantine Person Wise Report

This report shows the patients selfie details & staff selfie details

• Inter State Returnee Report: Seva Sindhu

This report shows the Inter State Returnee Report – Dist. wise, Location Wise with Family status.

• Data Entry and Verification

This report is for Data entry and Verification.

• Patient ID Wise and District Wise PC & SC.

This report shows the list of Primary / secondary contacts entered in contact tracing App.

• District Wise Number of Contacts

This report shows the number of patients, number of contacts traced & number of contacts verified

• Patient ID who have NILL Contact

This report shows the district wise & patient wise number of primary and secondary contacts traced between any two dates.

• Export to Excel of PC & SC

This link is used to download the list of primary and secondary contacts registered in Contact tracing APP.


**Covid Bed Slot Booking System**

It's a full-fledged working website where it performs functionaries like booking bed slot in various hospitals, add number of hospital and their beds, store the user information.

The project Covid Bed Slot Booking System includes registration of patients, storing their details into the system, and also computerized billing for beds in the hospitals.

The software has the facility to give a unique id (srfid) for every patient and stores the details of every patient automatically. It includes a facility to know the current status of availability of beds at each listed hospital.

This is a system that will manage information about list of various hospitals, availability of beds in hospitals, allotment of beds for patients and display patient details

## 1.3 Processes

Option for the system administrator to manage sequence of processes.

- Collecting the patient's information regarding their physical health, symptoms, COVID test conformation certificate etc.
- Validating the patient's given data
- Authority for the hospital to enter their data regarding their bed slots availability in different ward etc
- Opportunity for the patient or the user to check and book the bed slots among various sections
- Storing all the users data and reflecting them to the hospital as well as admins
- Sending SMS for the patient on conformation of slots
- Authority to for the hospitals to get detailed information about the patient details.
- Then the division of system modules to be done, Under the system modules different specifications are added

## 1.4 Problem With Present Situation

In the present system, the patient's relatives have to go from hospital to hospital where after going from 5-10 hospitals if the patient is lucky enough patient gets a bed, but not all people get a bed in hospitals as a result of this they lose their life. And there are many websites available that provide bed management but none of these provide a facility to the patient where they can request for bed themselves neither any app is introduced which makes bed management tasks easy.

## 1.5 Solution

The app is designed to solve this problem by providing a bed booking system to the users. The user will be provided bed status of all hospitals in a city and hospital-wise bed status. The patient can request for bed by uploading their Aadhaar card and corona positive certificate for verification. Then at the hospital side, the hospital can see the bed request, and then they can approve or reject the patient's request the patient receives an SMS on their mobile number to show to the reception when they reach the hospital.

## 1.6 Methodologies

1. Covid bed slot booking website management.
2. Patient Management – Patient Registration, managing patient database, recording their physical and medical statistics.
3. Covid report management.
4. Allocation of beds depending upon the severity.
5. Separate rooms, wards management.
6. Verification of patient through the sent SMS or Receipts.
7. Hospital login to check the patient's statistics, number of bed allotted, covid report status.
8. List of the patients and their information.
9. Efficient management of availability of beds and discharge information of patients.

## 1.7 Outcomes

Covid Bed Slot Management is not at all an easy task, the concerned person has to manage many things. It requires a lot of decision making which is difficult to some extent. that the system was facing. The solution to maintaining everything in a proper way is to accessing the Bed Slot Management System Webpage, it is the need of every hospital, as well as other factors, are cost-effective, reliable and efficiency have become the backbone of the hospitals. There are many advantages of this system but the main is it makes the system self-sufficient.

**Easy to access Patient Data:** Patient data is useful for the whole life, it is essential that you should have it in your data records. The well professional hospital should have proper records of their patients and there should not be a situation when their patients or some other concern person

including the doctor should wait for the patient's data. Data can be needed again and again and even doctors can ask for the reports so it will help it out to save time.

**Efficiency:** When you will install this software then automatically the functionality will improve and this system will enhance the efficiency of the hospital. Without any human intervention, you can increase the efficiency of the system. The best thing, if the system will work on the management, then the human issues would be sorted out like miscommunication, delays due to laziness. It assures that the work is appropriate and have completed in the right way. The work will be done properly and assigned to everyone in a proper way.

**Online Appointment:** Patients don't have to wait in the line for hours with the tap on the screen they can book their bed slot in the respective hospitals.

## 1.8 Organization of Report

The project Report is organized into five chapters. The layout of every chapter is given below.

**Chapter 1:** Contains an introduction to the present work carried out. Additionally, literature- survey carried out, objectives and methodology of this project. In this chapter we have studied about background of employee payroll system where we have described about the hardships faced by existing system.in this literature survey is also explained. Disadvantages and pitfalls of the existing system is explained where in those disadvantages have been resolved by our software. objectives and methodology are explained which gives brief description of our system and some advantages.

**Chapter 2:** Contains requirements and system analysis with performance requirement and functional dependency. All the minimum system requirements configuration that a system must have in order for the software application to run smoothly and efficiently. Failure to meet these requirements can result in installation problems or performance problems.

**Chapter 3:** Contains the information about normalization of our software. Normalization process, forms of normalization and normalization of payroll management system has been explained. Our payroll system obeys all the normalization forms and rules. In the further chapter conceptual representation has been described to show how the schema and ER diagrams are design.

**Chapter 4:** Contains conceptual representation of application. It describes the detailed design used to build the employee payroll management system. The design chapter includes the schema diagram and the entity relationship diagram of the employee payroll management system that is required to design the database. In future chapter implementation,design, code, snapshots of software, conclusion and future scope is explained.

**Chapter 5:** Contains information of design, implementation, validation and conclusion. The design and implementation of the entire project has been explained. It contains the modules of the payroll management system. The overall working model of the application is being explained along with snap shorts. The implementation part contains the front end and back-end code, and the queries of the create tables. The design part contains the snap shots of the of our application. The next chapter contains the validation of the project, references, and conclusion.

# CHAPTER 2

# REQUIREMENTS AND SYSTEM ANALYSIS

In this chapter, we will discuss and analyse about developing process of COVID bed slot Management System including software requirement specification. The functional and non-functional requirements are included in requirement part to provide complete description and overview of system requirement before the developing process is carried out.

## 2.1 Hardware And Software Requirements

### 2.1.1 General Description

The primary purpose to develop this system is to optimise the COVID bed slot Management System process for an organisation. The main objective of this application is to build an online bed slot booking platform, which allows a user to book a bed in a preferred hospital looking at the number of beds available. The project Covid Bed Slot Booking System includes registration of patients, storing their details into the system, and also computerised billing for beds in the hospitals.

### 2.1.2 Software Specification

Tools Used

- Frontend: Html, CSS, Bootstrap
- Backend: MySQL, Python
- Frontend And Backend Connectivity: Flask SQLAlchemy with MYSQL
- Software: Xampp Server

For Users:

- Internet Connectivity
- Web Browser (Chrome, Firefox)

### 2.1.3 Hardware Specification

- Operating System – Windows Browser that supports HTML, CSS, Bootstrap.
- Keyboard: Any Keyboard
- Processor:  Pentium IV processor or greater
- RAM: 128 mb or greater

• Device: Laptop/Computer

## 2.2 System Requirements

### 2.2.1 Non functional requirements

Usability

• The software must have a simple and user-friendly interface.

• The navigation to various pages should make it more convenient to the users so as to save time and confusion.

### 2.2.2 Performance Requirements

• The users must get the response within seconds i.e. the response time of a particular function should be minimum.

• Completely separate business login at server side from the student interface ensures good performance.

• The system would exhibit high performance because it would be well optimised.

### 2.2.3 Backup

There should be an easy back-up feature for the entire data, to prevent losing any data.

### 2.2.4 Platform/Browser independence

The system should be able to work on any of the modern browsers like Firefox / Explorer / Opera / Chrome, and any of the common Operating Systems like Linux, Windows and Mac OS.

## 2.3 Functional Dependency

• **Full dependency**: In a relation the attribute(S) B is fully functionally dependent on A if B is functionally dependent on A but not on any proper subset of A.

• **Partial dependency**: If there is some attribute that can be removed from A and dependency still holds.

• **Transitive dependency**: In a relation if attribute(S) A->B and B->C, then C is transitively dependent on A via B.

### 2.3.1 Booking Patient

| PID | Srfid | Bedtype | Hcode | Spo2 | Pname | Pphone | Paddress |
|-----|-------|---------|-------|------|-------|--------|----------|
|     |       |         |       |      |       |        |          |

**Functional Dependencies**

PID --> (Srfid, Bedtype, Hcode, Spo2, Pname, Pphone, Paddress)

PID+= (PID, Srfid, Bedtype, Hcode, Spo2, Pname, Pphone, Paddress)

Candidate key= PID

**Justification**

- The above-mentioned dependencies we can observe that the Booking Patient relation is in 1NF as all the attributes are atomic in nature.
- The relation is in 2NF as all the Non-Prime attributes are fully functionally dependent on the Prime attribute and there is no partial dependency.
- The relation is also in 3NF as there is no Transitive dependency between the Non-Prime attributes and the Prime attribute.

**2.3.2 Hospital Data**

| HDID | Hcode | Hname | Normalbed | HICUbed | ICUbed | Vbed |
|------|-------|-------|-----------|---------|--------|------|

**Functional Dependencies**

HDID --> (Hcode, Hname, Normalbed, HICUbed, ICUbed, Vbed)

HDID+= (HDID, Hcode, Hname, Normalbed, HICUbed, ICUbed, Vbed)

Candidate key= HDID

**Justification**

- The above-mentioned dependencies we can observe that the Hospital Data relation is in 1NF as all the attributes are atomic in nature.
- The relation is in 2NF as all the Non-Prime attributes are fully functionally dependent on the Prime attribute and there is no partial dependency.
- The relation is also in 3NF as there is no Transitive dependency between the Non-Prime attributes and the Prime attribute.

### 2.3.3 Hospital User

| HUID | Hcode | Email | Password |
|------|-------|-------|----------|

**Functional Dependencies**

HUID --> (Hcode, Hname, Email, Password)

HUID+= (HUID, Hcode, Hname, Email, Password)

Candidate key= HUID

**Justification**

- The above-mentioned dependencies we can observe that the Hospital User relation is in 1NF as all the attributes are atomic in nature.
- The relation is in 2NF as all the Non-Prime attributes are fully functionally dependent on the Prime attribute and there is no partial dependency.
- The relation is also in 3NF as there is no Transitive dependency between the Non-Prime attributes and the Prime attribute.

### 2.3.4 Triggered Data

| TDID | Hcode | Normalbed | HICUbed | ICUbed | Vbed | Queries | Date |
|------|-------|-----------|---------|--------|------|---------|------|

**Functional Dependencies**

TDID --> (Hcode, Normalbed, HICUbed, ICUbed, Vbed, Queries, Date)

TDID+= (TDID, Hcode, Normalbed, HICUbed, ICUbed, Vbed, Queries, Date)

Candidate key= TDID

**Justification**

- The above-mentioned dependencies we can observe that the Triggered Data relation is in 1NF as all the attributes are atomic in nature.
- The relation is in 2NF as all the Non-Prime attributes are fully functionally dependent on the Prime attribute and there is no partial dependency.
- The relation is also in 3NF as there is no Transitive dependency between the Non-Prime attributes and the Prime attribute.

**2.3.5 User**

| UID | Srfid | Email | Dob |
|-----|-------|-------|-----|

**Functional Dependencies**

UID --> (Srfid, Email, Dob)

UID+= (UID, Srfid, Email, Dob)

Candidate key= UID

**Justification**

- The above-mentioned dependencies we can observe that the USER relation is in 1NF as all the attributes are atomic in nature.
- The relation is in 2NF as all the Non-Prime attributes are fully functionally dependent on the Prime attribute and there is no partial dependency.
- The relation is also in 3NF as there is no Transitive dependency between the Non-Prime attributes and the Prime attribute.

# CHAPTER 3

# NORMALIZATION

**Normalization** is a database design technique that reduces data redundancy and eliminates undesirable characteristics like Insertion, Update and Deletion Anomalies. Normalization rules divides larger tables into smaller tables and links them using relationships. The purpose of Normalisation in SQL is to eliminate redundant (repetitive) data and ensure data is stored logically.

The inventor of the relations model Edgar Codd proposed the theory of normalization of data with the introduction of the First Normal Form, and he continued to extend theory with Second and Third Normal Form. Later he joined Raymond F. Boyce to develop the theory of Boyce-Codd Normal Form.

## 3.1 Database Normal Forms

Here is a list of Normal Forms in SQL

- 1NF (First Normal Form)
- 2NF (Second Normal Form)
- 3NF (Third Normal Form)
- BCNF (Boyce-Codd Normal Form)
- 4NF (Fourth Normal Form)
- 5NF (Fifth Normal Form)

The Theory of Data Normalization in MySQL server is still being developed further. For example, there are discussions even on 6th Normal Form. However, in most practical applications, normalisation achieves its best in 3rd Normal Form. The evolution of Normalization in SQL theories is illustrated below.



Figure 3.1: Database Normal Forms

Database Normal Forms

A KEY in SQL is a value used to identify records in a table uniquely. An SQL KEY is a single column or combination of multiple columns used to uniquely identify rows or tuples in the table. SQL Key is used to identify duplicate information, and it also helps establish a relationship between multiple tables in the database.

Note: Columns in a table that are NOT used to identify a record uniquely are called non-key columns.

### 3.1.1 1NF (First Normal Form) Rules
- Each table cell should contain a single value.
- Each record needs to be unique.

### 3.1.2 2NF (Second Normal Form) Rules
- Rule 1- Be in 1NF
- Rule 2- Single Column Primary Key that does not functionally dependant on any subset of candidate key relation

### 3.1.3 3NF (Third Normal Form) Rules
- Rule 1- Be in 2NF
- Rule 2- Has no transitive functional dependencies

To move our 2NF table into 3NF, we again need to again divide our table.

### 3.1.4 BCNF (Boyce-Codd Normal Form)
Even when a database is in 3rd Normal Form, still there would be anomalies resulted if it has more than one Candidate Key.

Sometimes is BCNF is also referred as 3.5 Normal Form.

# CHAPTER 4

# CONCEPTUAL REPRESENTATIONS OF APPLICATION

In this chapter, we will study detailed design used to build the COVID bed slot management system. The design chapter includes the schema diagram and the entity relationship diagram of the COVID bed slot management system that is required to design the database. A database schema diagram is the structure that represent the logical view of entire database. A database schema defines its entities and the relationship among them. An entity relationship diagram also called as ER diagram is a graphical representation of entities and their relationships to each other typically used in the computing in regard to the organisation of the data within the database on the information systems.

## 4.1 Entity Relationship Diagram (ER Diagram)

**ER Diagram** stands for Entity Relationship Diagram, also known as ERD is a diagram that displays the relationship of entity sets stored in a database. In other words, ER diagrams help to explain the logical structure of databases. ER diagrams are created based on three basic concepts: entities, attributes and relationships. ER Diagrams contain different symbols that use rectangles to represent entities, ovals to define attributes and diamond shapes to represent relationships.

The ER diagram shows the relationship among entity sets. An entity set is a group of similar entities and these entities can have attributes. In terms of DBMS, an entity is a table or attribute of a table in database, so by showing relationship among tables and their attributes, ER diagram shows the complete logical structure of a database.

Here are the geometric shapes and their meaning in an E-R Diagram

The ER diagram for Covid Bed Slot Booking System is as shown above in the Figure 4.1.

The covid bed slot booking database system mainly consists of 6 entities namely User, Admin, Hospital data, Hospital user, Patient, Triggered data.
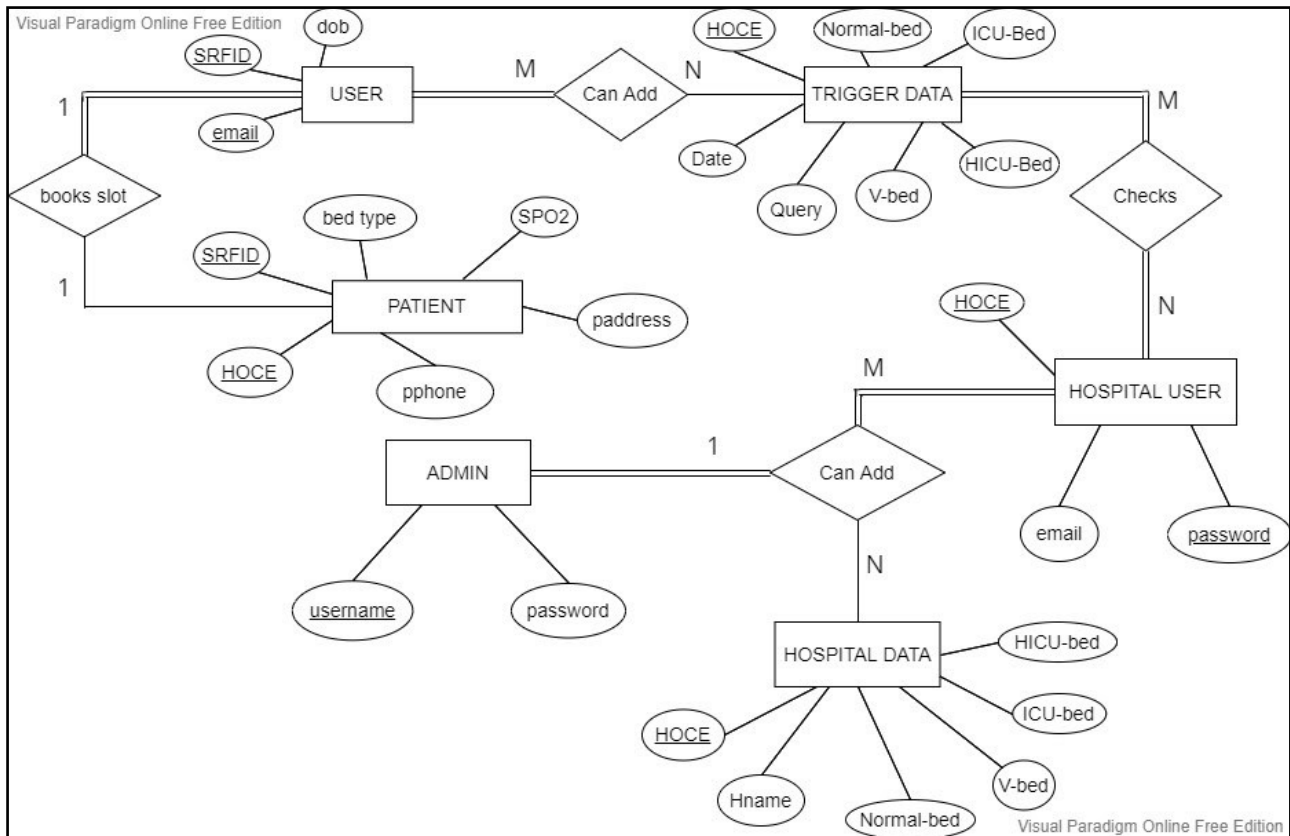
Figure 4.1: ER diagram

- **User** and **patients** have **1:1** cardinality ratio, since 1 user can book 1 slot for patient having **unique SDFID**. User has **total participation** in all relation.

- **User** can *check* **Triggered data** of the Hospital which contains all the details about available beds in the hospital and has **M: N** cardinality ratio

- **Hospital user** can *add or update* the **Hospital data** which consists of available beds in the hospital and will get updated regularly.

- Hospital data and Hospital user has **M: N** cardinality ratio.

- **Hospital user** and **Triggered data** have **M: N** cardinality ratio and both have **total participation**.

- **Admin** *adds* **Hospital user** and in-turn hospital user adds the hospital data. Admin has **total participation** in adding hospital user and has **1: N** cardinality ratio.

## 4.2 Schema Diagram

A schema diagram can display only some aspects of a schema like the name of record type, data type and constraints. Other aspects can't be specified through the schema diagram.

**ADMIN** (<u>Username</u>, Password)

**HOSPITAL USER** (<u>Hoce, Password</u>, Email)

**HOSPITAL DATA** (<u>Hoce</u>, Hname, Normalbed, Vbed, HICUbed, ICUbed)

**TRIGGERED DATA** (<u>Hoce</u>, Normalbed, Vbed, HICUbed, ICUbed, Query, Date)

**USER** (<u>Email, Srfid</u>, Dob)

**PATIENTS** (<u>Hoce, Srfid</u>, Bedtype, SPO2, Pphone, Paddress)
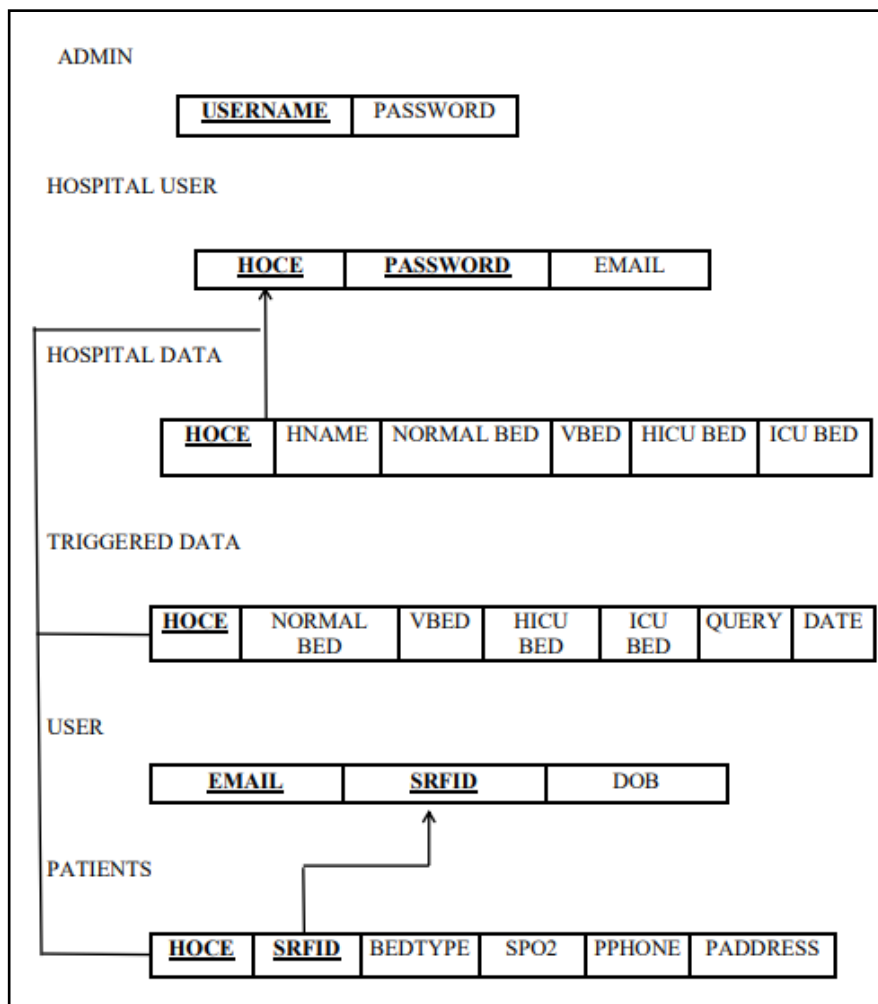


Figure 4.2 : Schema Diagram

# CHAPTER 5

# DESIGN AND IMPLEMENTATION

## 5.1 Modules available in application

- Admin module : This module is of admin, the person who is only has all permissions and generates timetable.
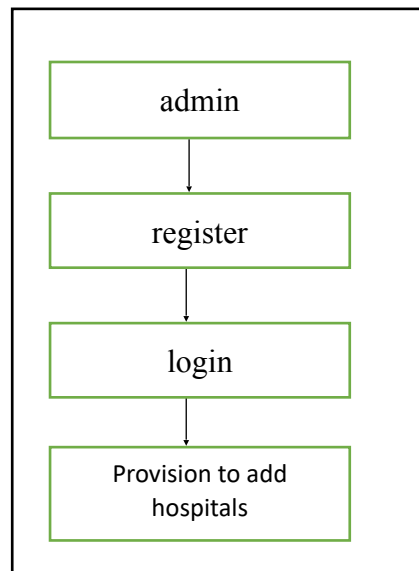


Figure 5.1 : Admin module

- Patient module : This module is of user/patient who can view the available beds.
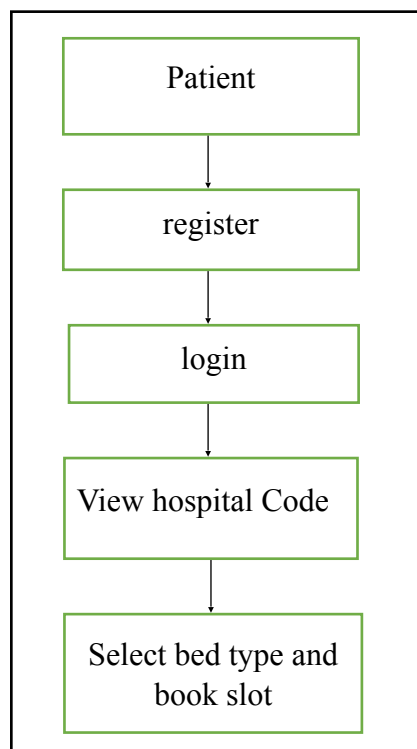


Figure 5.2 : Patient module

- Hospital module : In Hospital module, listed hospitals can add hospital details like various beds (ICU, Normal, Ventilator etc..) available in their hospital. The entered details can be modified (update, delete) and can be viewed using triggered data section.
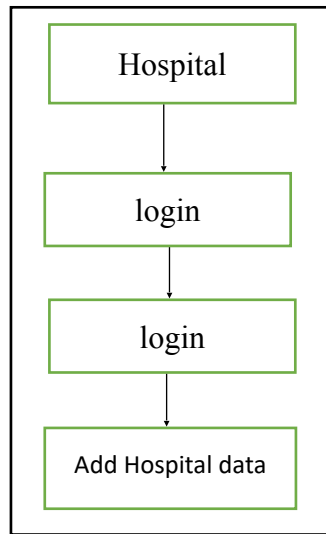


Figure 5.3 : Hospital module

## 5.2 Actors Diagram

- User case diagram is also known as actor diagram.

  A use case diagram is used to represent the dynamic behaviour of a system. It encapsulates the system's functionality by incorporating use cases, actors, and their relationships.

- It models the tasks, services, and functions required by a system/subsystem of an application. It depicts the high-level functionality of a system and also tells how the user handles a system.

- The main purpose of a use case diagram is to portray the dynamic aspect of a system. It accumulates the system's requirement, which includes both internal as well as external influences. It invokes persons, use cases, and several things that invoke the actors and elements accountable for the implementation of use case diagrams.

- An actor in a UML diagram represents a type of role where it interacts with the system and its objects. It is important to note here that an actor is always outside the scope of the system we aim to model using the UML diagram.

- We use actors to depict various roles including human users and other external subjects. We represent an actor in a UML diagram using a stick person notation. We can have multiple actors in a sequence diagram.
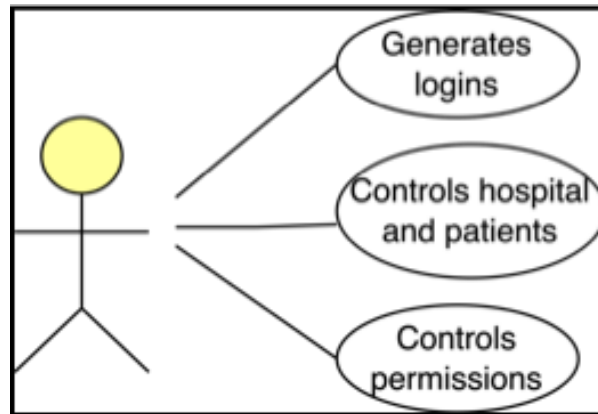


Figure 5.4: Admin actors diagram
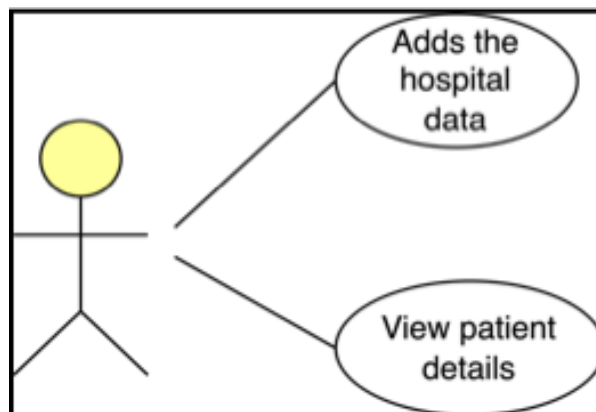


Figure 5.5 : Hospital actors diagram
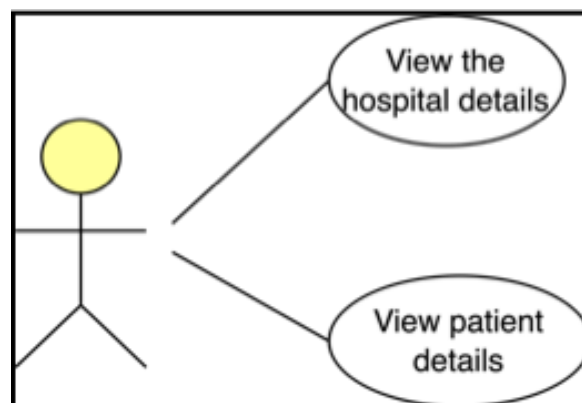


Figure 5.6: Patient actors diagram

## 5.3 Front End Design

### 5.3.1 Screen Layout Design for Webpages, forms

Screen layout is the part of graphic design that deals with the arrangement of visual elements on a page. Screen layout is used to make the web pages look better. It establishes the overall appearance, relative importance and relationships between the graphic elements to achieve a smooth flow of information and eye movement for maximum effectiveness or impact.

Using visually attractive and simple design forms the basis of all the screen layout design and using these layouts in authentication and login makes it easy to use and user-friendly.

Screen layout determines the overall structure of your screen. They define the structure of a harness included in a composite portal. A harness can contain only one screen layout.

A screen layout is comprised of the following:

- <header> - Defines a header for a document or a section

- <nav> - Defines a set of navigation links

- <section> - Defines a section in a document

- <article> - Defines an independent, self-contained content

- <aside> - Defines content aside from the content (like a sidebar)

- <footer> - Defines a footer for a document or a section
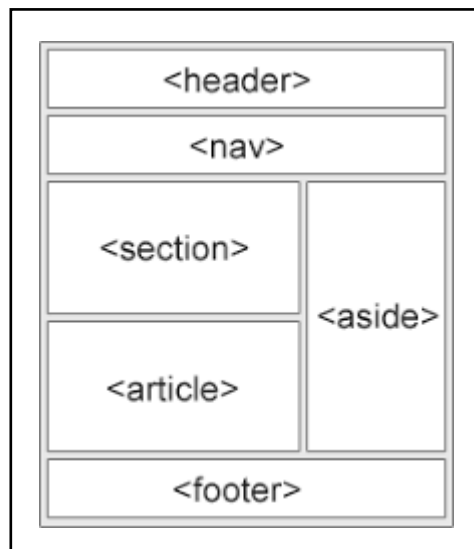


Figure 5.7: Screen Layout Design

## 5.4 Front End and Back End Connectivity

**Flask SQLAlchemy with MySQL**

MySQL is developed, distributed, and supported by Oracle Corporation. MySQL is a database system used on the web that runs on a server. MySQL is ideal for both small and large applications. It is very fast, reliable, and easy to use. It supports standard SQL. MySQL can be compiled on a number of platforms.

**What is SQLAlchemy ?**

SQLAlchemy is the Python SQL toolkit and Object Relational Mapper that gives application developers the full power and flexibility of SQL.

It provides a full suite of well-known enterprise-level persistence patterns, designed for efficient and high-performing database access, adapted into a simple and Pythonic domain language.

**What is Flask-SQLAlchemy ?**

Flask-SQLAlchemy is an extension for Flask that adds support for SQLAlchemy to your application. It aims to simplify using SQLAlchemy with Flask by providing useful defaults and extra helpers that make it easier to accomplish common tasks.

**Installation**

You can simply install Flask-SQLAlchemy using pip command.

**pip install Flask-SQLAlchemy**

So now after installation you need to create database, we are using Mysql database. For this you need to download and install Wampp Server. Create a database in the Wamp Server,with flaskcodeloop for the database name, but you can give the name according to your choice.

Right now we don't have any tables in our database, we will create this using Flask SQLAlchemy.
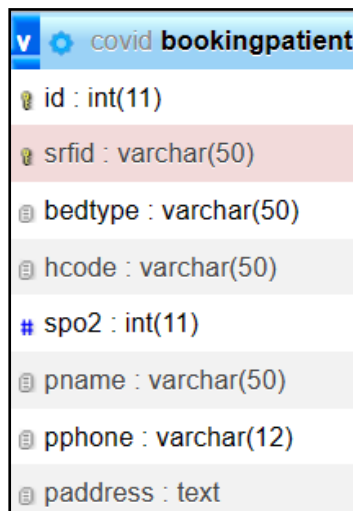
Below is a **app.py** and we have added our SQLAlchemy and database configuration.

## 5.5 Table creation

**Table : bookingpatient**

CREATE TABLE `bookingpatient` (

  `id` int(11) NOT NULL,

  `srfid` varchar(50) NOT NULL,

  `bedtype` varchar(50) NOT NULL,

  `hcode` varchar(50) NOT NULL,

  `spo2` int(11) NOT NULL,

  `pname` varchar(50) NOT NULL,

  `pphone` varchar(12) NOT NULL,

  `paddress` text NOT NULL

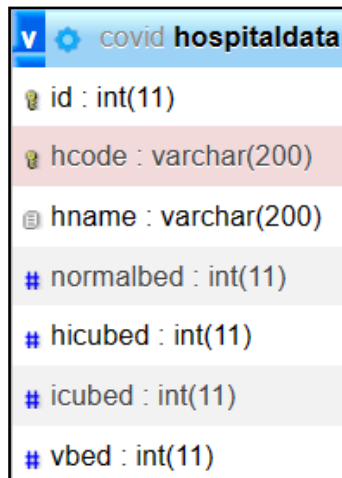) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;

Table 5.1 :bookingpatient



**Table :hospitaldata**

CREATE TABLE `hospitaldata` (

  `id` int(11) NOT NULL,

  `hcode` varchar(200) NOT NULL,

  `hname` varchar(200) NOT NULL,

  `normalbed` int(11) NOT NULL,

  `hicubed` int(11) NOT NULL,

  `icubed` int(11) NOT NULL,

  `vbed` int(11) NOT NULL

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;

Table 5.2 :hospitaldata
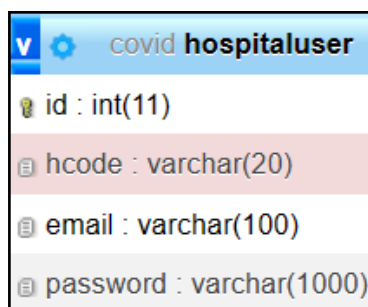


**Table :hospitaluser**

CREATE TABLE `hospitaluser` (

`id` int(11) NOT NULL,

`hcode` varchar(20) NOT NULL,

`email` varchar(100) NOT NULL,

`password` varchar(1000) NOT NULL

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;

Table 5.3 :hospitaluser
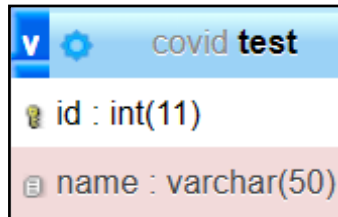


Table :test

CREATE TABLE `test` (

`id` int(11) NOT NULL,

`name` varchar(50) NOT NULL

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;

Table 5.4: user
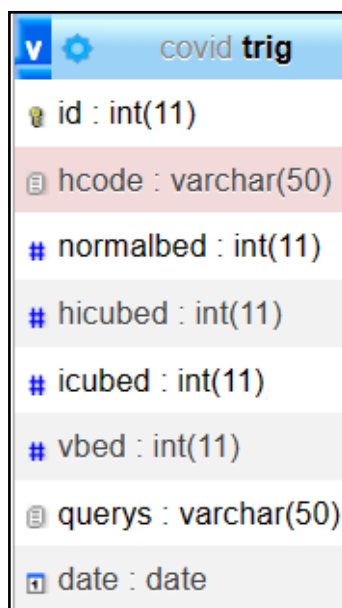


**Table :trig**

CREATE TABLE `trig` (

  `id` int(11) NOT NULL,

  `hcode` varchar(50) NOT NULL,

  `normalbed` int(11) NOT NULL,

  `hicubed` int(11) NOT NULL,

  `icubed` int(11) NOT NULL,

  `vbed` int(11) NOT NULL,

  `querys` varchar(50) NOT NULL,

  `date` date NOT NULL

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;

Table 5.5 : trig

**Table :user**

CREATE TABLE `user` (

   `id` int(11) NOT NULL,

   `srfid` varchar(20) NOT NULL,

   `email` varchar(100) NOT NULL,

   `dob` varchar(1000) NOT NULL

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;

Table 5.6 : user



## 5.6 Design

It contains a detailed description about each interface along with a screen shot of the interface.

a) Login Page: Login page contains the login credentials like username and password. Below is the snapshot of the login page.
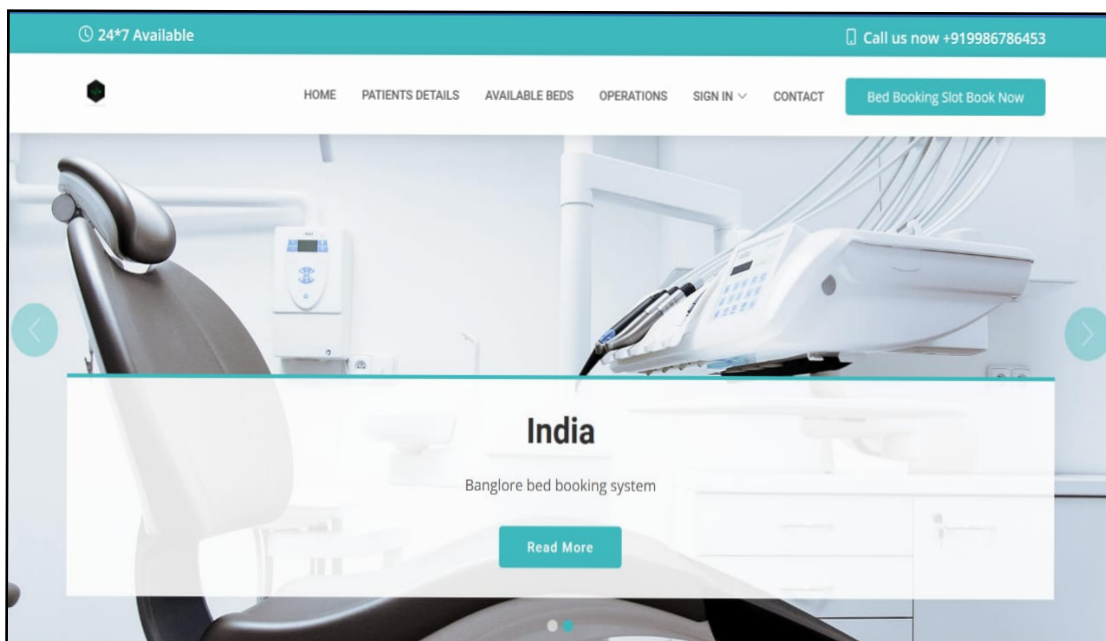


Figure 5.8 : Login Page

b) Home Page: The home page of our application is common to all the users and administrators. The home page shows the following categories:

a) Admin

b) Hospital user

c) Patient

The below image shows the snapshot of the Home page of our Covid bed slot Management System.
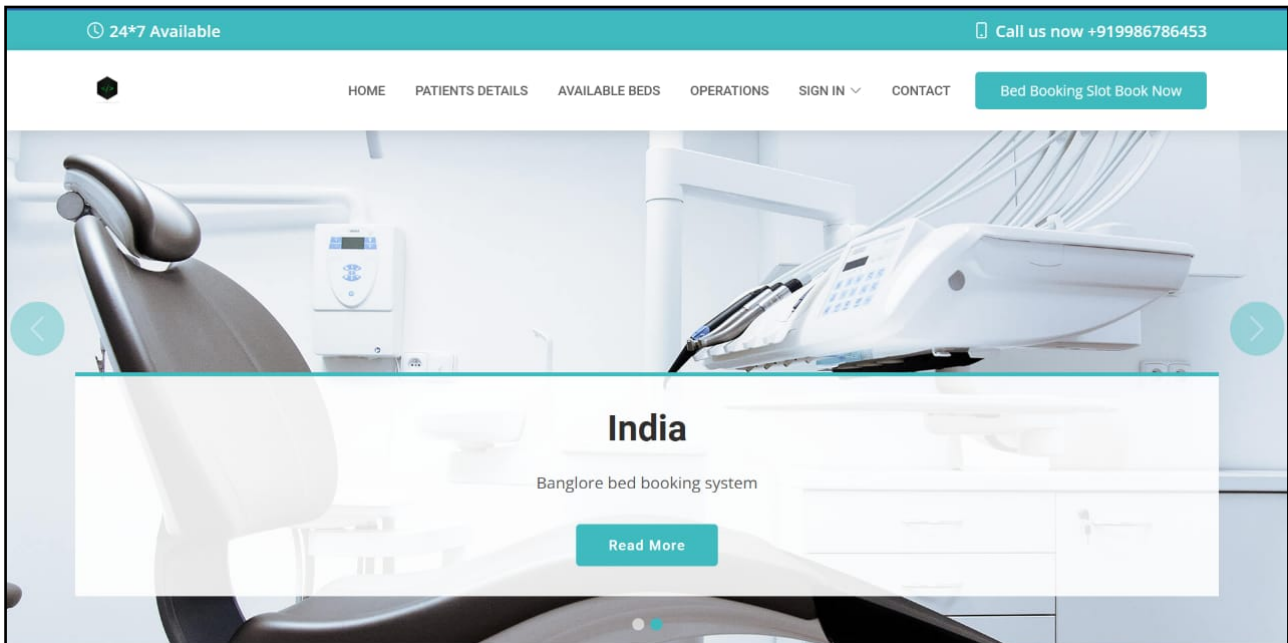


Figure 5.9: Home Page

The home page contains the following functionalities:

1) Sign in

2) Admin Login

3) Hospital Login

4) Patient Login

5) Patient Details

    1) **Sign in** : Sign in table consists of the information about new user resistration, old user login option. Sign in table consists of –

        a) Admin Login

        b) Hospital User Login

        c) Patient Login

    2) **Admin Login**: Admin can login to his account through user id and password.
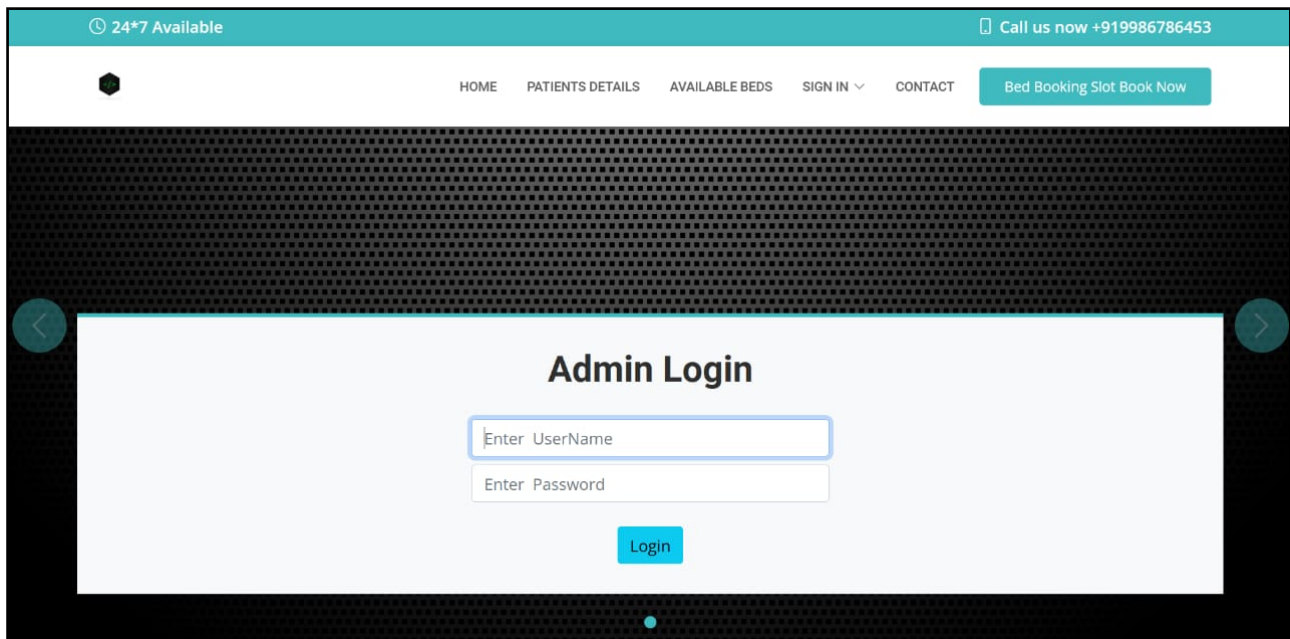
Here is the image for Admin Login;



Figure 5.10 : Admin Login

Addition of Hospital User: After logging in, he will add the hospital details to the web page or application. A unique code will be given to every hospital by the admin.
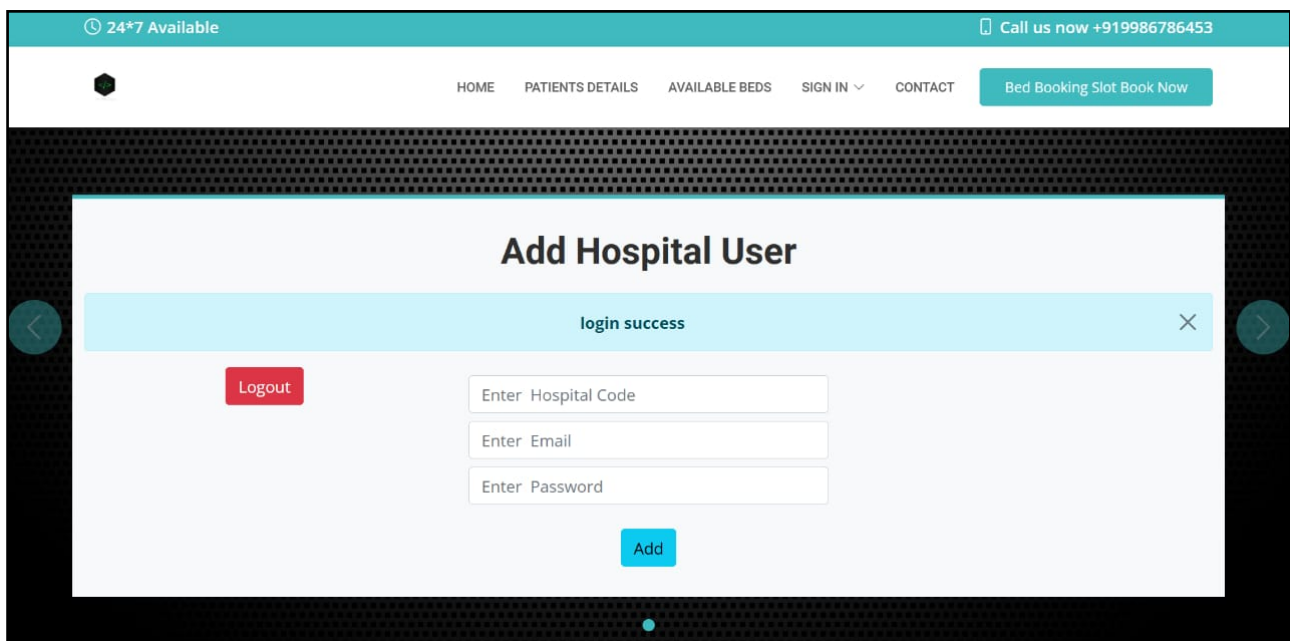


Figure 5.11: Add Hospital User

3) **Hospital Login**: Hospital user login to the hospital account by the user id , hospital code and password which is given by the admin to the hospital.



Figure 5.12 : Hospital Login

Hospital user log in to the hospital account by using email id and password.

Updation : After logging into the hospital account, the hospital user updates the available beds in their hospitals. The hospital user enters the  available number of ICU beds, HICU beds, ventilation beds and normal beds.



Figure 5.13 : Book Bed Slot

Here the below image shows the data entered by the hospital user which contains hospital code, hospital name and the total available beds.

4) **Patient Login**: New users of the application will sign up for the website. After signing in, the



Figure 5.14: Add Hospital Data

patient will go the home page, where he will add the patient details. Here is the image of the patient details which is added by the patient.



Figure 5.15 : Patient Details

## 5.7 Testing and Validation

**Use case Diagram**

Use case diagrams model the functionality of a system using actors and use cases. Use cases are a set of actions, services, and functions that the system needs to perform. In this context, a "system" is something being developed or operated, such as a web site. The "actors" are people or entities operating under defined roles within the system.
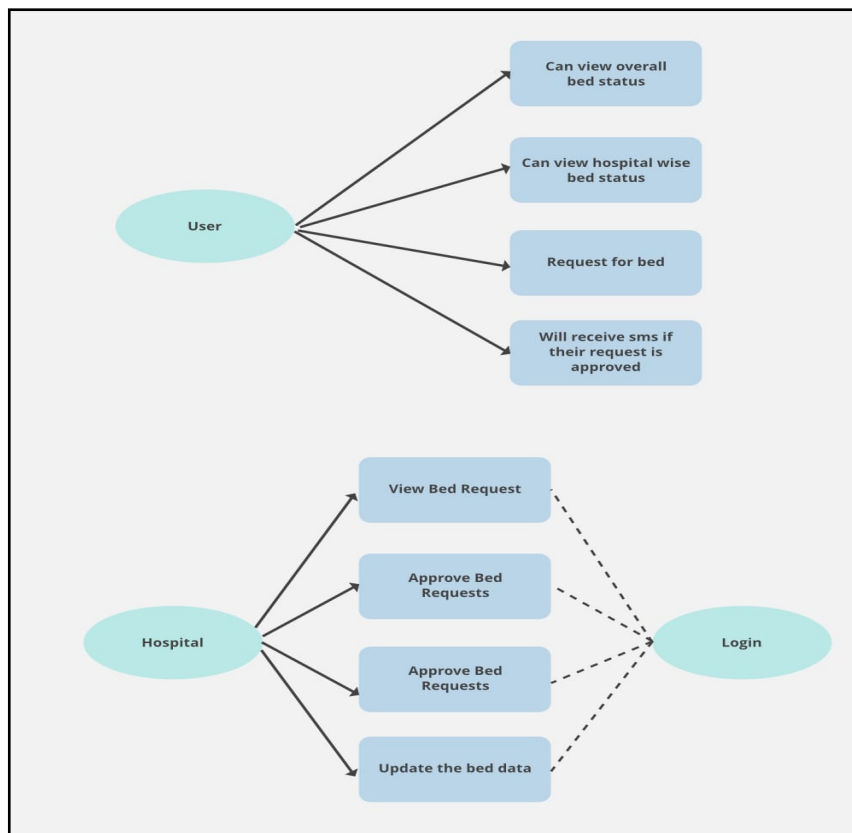


Figure 5.16 : Use Case Diagram

• The user id and password cannot be blank while logging into the site.

 • In email id field, '@' character is mandatory.

 • In modify password page, user has to specify user id, old password as well as the new password.

  • In edit user or new account page, some fields and mandatory like login id, password, employee id, company id, admin id, etc

# CHAPTER 6

## Conclusion and Future Scope

Presently this application is designed to be very User Friendly. Many features are enhanced to the College placement management system. With this application most of the TPO's time is saved. The features of the system can be further enhanced in many ways. The documentation that has enclosed can enable even a person with minimum knowledge to understand it well. Presently, this application is run on local host.

The Covid Bed Slot Booking is a great improvement over the manual system which uses lots of manual work. The computerization of the system speeds up the process. This system was thoroughly checked and tested with dummy data and found to be reliable.

The new coronavirus spreading rapidly all over the world is transmitted through respiratory droplets andvia contact transmission. Moreover, as a hospital is a relatively centralized environment, it is important tocontrol the sources of infection and cut off the transmission routes in these locations. During theepidemic, to prevent cross-infection between children, the rehabilitation department reduced the numberof beds and controlled the number of caregivers in hospital, which enabled expansion of the bed spacebetween each hospitalized child. It is a difficult business to appropriately treat children and configure thebeds under these circumstances. In this paper, a queuing model with priority was applied to analyze thestate of patient admission. This approach not only ensures that children with serious illnesses will gettimely, effective and safe treatment, but also enables the occurrence of infections on the ward to beeffectively controlled.

Five trends to modernize COVID bed slot management system

Perhaps the greatest by-product of tech advancement in healthcare has been our ability to create more personalized experiences patients want from their healthcare. Better understanding each patient's 'health continuum' helps make this a reality, by leveraging data and insights to follow patients throughout their entire care journey – from hospital to home –so patients can actively contribute to and participate in their journey.

The advancement of technology and the insights it provides is allowing us to break the silos that have traditionally made care coordination throughout a patient's journey difficult. As healthcare

facilities across the world are looking to improve both the patient and provider experiences, these are five trends we see dominating the discussion among CIOs:

3)Reinforcing focus on strategic value creation for healthcare organizations

Today's CIO is hard-pressed to support the strategic objectives of their healthcare organization, while staying within their budget – which are expected to face increasing strain as a result of COVID-19 [1]. They're actively seeking to invest in technology that's cloud-based, and accessible via multiple platforms, both for business applications as well as health informatics applications

2)Engaging in modern business models when adopting technology

Keeping up with the rapidly changing technology landscape and increasingly complex IT industry requires engaging in innovative business models and true partnership with vendors to manage IT needs. Instead of a traditional model where a hospital may purchase and own technology outright, an increasing amount of healthcare CIOs are considering the Software-as-a-Service (SaaS) model for the procurement of their healthcare IT solutions, which keeps the ownership with the vendor, who will provide technical support, optimization opportunities, asset and data management, and so on.

3) Proactively enabling care coordination across the health continuum

Health systems are looking to improve operational and clinical efficiencies by creating shared infrastructures. Cloud-based solutions securely break data siloes and free up information that both the patient and provider can benefit from. We worked with one hospital in Rio de Janeiro, Hospital São Vicente de Paulo, that was struggling to control the life cycle of its patients' prescriptions as effectively as possible.

4) Deploying solutions that improve provider (and patient) experiences

US doctors work almost 60 hours a week and younger residents often work up to 80, enduring grueling 24-hour shifts at times. Long-term, unresolvable job stress leads to the exhaustion and burnout that affected 44% of physicians in 2019, according to Medscape's annual report [2]. Adding to this, Philips' Future Health Index found that 72% of healthcare professionals under 40 around the globe regularly experience work-related stress.

5) Building systems of engagement

The trouble with traditional EMRs and other information systems has been their limitations as systems of record, or systems that simply host data. Becoming systems of engagement is what will ensure today's IT solutions can provide real value. A system of engagement enables people to interact with their data, devices, and technology with ease. It liberates data from silos, enabling caregivers to easily extract valuable insights, take action and collaborate on care.

## 6.1 Applications

- Patients can schedule services in comfort of their home.

- Quick and easy booking of beds for patients.

- Online scheduling system operate 24/7.

- Online Booking reduces the appointment gaps and hence immediate concern can be shown for the patient.

- User-friendly and error free experience for the user booking the bed slot

## 6.2 Conclusion

The project work titled "Covid Bed Slot Booking System" has been designed using Python wherein many user-friendly form controls have been added in order to make it a user interactive application. The system is developed in such a way that the user with common knowledge of computers can handle it easily. The system forms a general platform for building a most advanced bed slot booking systems.

So, the Covid Bed Slot Booking System is mainly used to list the various hospitals, to store the hospital details such as types of beds available, slot bookings, triggered data and patient details.

This is a small prototype of a COVID-19 Covid Bed Slot Booking System web application foreasy ongoing of hospital management. The application is built efficiently being user friendlysuch that data can be added, subtracted and updated as quick as possible.Such an application, if built with professional expertise, can be highly useful for theemerging COVID-19 pandemic where management for

many patients' data is essential.

Theprepared system proves its essentiality completely as data can be sorted out on the basis ofseveral parameters.The usage of this system can fasten the work and make it easier for the user as well ashospital admins to manage data.A legal implementation of this application can be if the government decides to provide a WMS and makes it easier for the officials and users to manage data and make sure the attention is drawn towards treating the patients rather than stakeholders' details' management. At this time where health and sanitation should be given the highest priority,systems such that COVID-19 Covid Bed Slot Booking System should be used efficiently sothat everything becomes easier.

## 6.3 Future Advancements

- The data on the patients' prescriptions and the medicines can be added so that thedoctors can monitor the patients even after discharge for the certain period of time.

- The ongoing treatment of the patient can be recorded so that the next procedures canbe planned and hospital assets can be efficiently monitored.

- Many post-discharge sophistications can be added so that patients have better healthand communication with the doctor.

- The platform can be hosted on online servers to make it accessible worldwide.

- Implement the backup mechanism for taking backup of codebase and database onregular basis on different servers.

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