A Project Report

On

SMART PG/HOSTEL BOOKING SYSTEM USING CLOUD COMPUTING

submitted for partial fulfillment of the requirements

for the award of the degree of

Bachelor of Technology

in

Computer Science and Engineering

Submitted by

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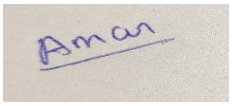
Dr. A.P.J. Abdul Kalam Technical University, Lucknow May, 2022

DECLARATION

We hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

Signature: 

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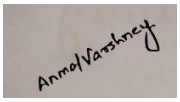
Signature: 

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This is to certify that Project Report entitled "Smart PG/Hostel Booking System using Cloud Computing" which is submitted by Aman Kumar Manna, Shashank Saxena, Anmol Varshney and Shivam Tomar in partial fulfillment of the requirement for the award of degree B. Tech. in Department of Computer Science & Engineering of Dr. A.P.J. Abdul Kalam Technical University, Lucknow is a record of the candidates own work carried out by them under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

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We also do not like to miss the opportunity to acknowledge the contribution of all faculty members, especially Professor Dilkeshwar Pandey, of the department for their kind assistance and cooperation during the development of our project. Last but not the least, we acknowledge our friends for their contribution in the completion of the project.

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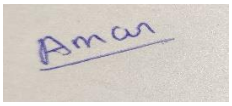
Signature: 

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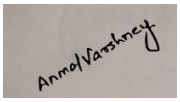
Signature: 

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ABSTRACT

It is very simple to find PG accommodation near your office. It was difficult in the past to travel to a place to work that was located over great distances, and as a result, we had to miss out on wonderful possibilities because we didn't know where to stay and were unfamiliar with a certain city. However, it is now much easier to obtain affordable lodging near the workplace. The Hostel Booking System is a web-based application for booking hostels for individuals. This will reduce manual labor and make hostel assignment considerably simpler for students and hostel administrators. It keeps track of data in a database and retrieves it as needed. We design this system for the ease and welfare of person seeking for residence when they are away from their hometown. The designed system is more user-friendly, GUI focused, reliable, efficient, and secure with access control mechanisms, overcoming the drawbacks of manual hostel management. Hostel booking systems have been impacted by outdated techniques that have limits. As a result, we're working on one. Cloud computing technologies will be used. A web app will be built that will run on both IOS, Android and Windows considering all the requirements specific to the hostel.

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LIST OF ABBREVIATIONS

JS	JavaScript
UI	User Interface
API	Application Programming Interface
REST	Representational State Transfer
SOAP	Simple Object Access Protocol
DB	Database

CHAPTER 1
INTRODUCTION

1.1 Introduction

The students coming from far off cities and towns often find it difficult to find the right accommodation for themselves. They aren't aware of which rooms are available for rent as many don't even put the "Room for Rent" boards outside their houses. So, either they must compromise with the basic facilities they require like room size, clean environment, security, water, electricity and mess facilities or they get it at higher prices. Also, they are unaware of the surrounding they are living in. Also, this COVID situation has made it more difficult to visit every location. The main idea of developing this project is to ease the students.

This Web Application will help to overcome the entire problem which they are facing currently by making everything digital and easily accessible. We students will develop the PG/Hostel booking system, and we will use libraries, databases, and a variety of techniques to complete our project. React JS, Node JS, Cloud computing, and so on.

While there are many, MEAN and MERN are just two of the popular stacks which have advanced out of JavaScript. Both stacks are made of open-source components and provide a stop-to-end framework for constructing complete net apps that enable browsers to connect to databases. The not unusual theme among the 2 is JavaScript and that is also the important thing advantage of the use of either stack. One can essentially avoid any syntax mistakes or any confusion by using just coding in one programming language, JavaScript. Another advantage of building net projects with MERN is the fact that it is easy to benefit from its enhanced flexibility. In order to recognize MERN stack, we want to understand the four components that make up the MERN particularly – MongoDB, Express JS, React and NodeJS. Alongside, we have made use of Heroku as a cloud platform.

1.2 Problem Statement

As the world is moving forward toward digital era, there is no doubt that the digitalization of things is the future. There is a problem relating to students who travel from one place to another mainly for education, so a solution is needed to resolve the problem related to finding a proper accommodation of the students. Solution must provide relief to students from searching rooms manually.

1.3 Project Objective

- **GUI:** Easy to use GUI (Graphical User Interface), hence any user with minimal knowledge ofoperating a system can use the software.
- **Platform independence:** The messenger operates on any system irrelevant of the underlyingoperating system.
- **Unlimited clients:** "N" number of users can be connected without any performance degradation of the server.
- **User friendliness:** The project should be very easy to use enabling even a novice person to useit.

1.4 Plan of Implementation

The plan is to develop a web application for the problem. The web application is supposed to be user friendly, platform independent and can be scalable if needed. The web application can run on any system or operating system with a browser and an active internet connection. We will be designing this application on NextJS so that the web application is faster and more interactive. We will also be using cloud in this so that all the features of the cloud are easily accessible (like scalability, disaster recovery, easy maintenance etc.). The cloud is supposed to be helping in backend in the backend functions. Cloud is also supposed to help in storing the data as if we use the cloud database it will help from data loss, single point of failure and it can handle large number of requests.

CHAPTER 2
LITERATURE SURVEY

We looked for numerous sites for a PG/Hostel booking system in this literature review and found a handful that were like what we required. We've mentioned the survey we'll use to do research for our project; with this survey, we'll be able to add to and update our project in stages.

2.1 Web Development

The authors in the paper ‘New technologies for web development (2010)’ talks about the new technologies that are used in development and can be a future. This includes the Tailwind CSS, HTML 5, and new JavaScript libraries like Next, React, Express etc.

The author ‘Yogesh Baiskar’ in his paper ‘MERN: A FULL STACK DEVELOPMENT’ talks about the full stack development. He mentions all the technologies in front-end, back-end and the various types of databases. He talks various technologies in front-end like HTML, CSS, various JS libraries and framework like angular, next, react etc. He also talks about backend technologies like flask, node etc. He compares the two types of databases, relational and non-relational. He also compares the two types of development used MERN and MEAN.

2.2 NextJS

From the website ‘https://medium.com/nerd-for-tech/nextjs-why-use-it-56946b6fc225’ we got to know many things about the NextJS. It tells that the NextJS is an extension of the ReactJS with more additional functionalities to React. It provides in with various features like less load time, server-side rendering, static site generation, image optimization and CSS in JS.

2.3 ExpressJS

Azat Mardan in his book 'Express.js Guide' wrote about the benefits and uses of ExpressJS. He mentioned everything about Express from history to its use in future. From this we come to know that the ExpressJS is NodeJS framework which is very useful in routing and API calls. Also, it tells Express is helpful in building server-side application smarter and faster. It also helps in reducing the code complexity as compared with node.

2.4 MongoDB

Hema Krishnan in his paper 'MongoDB – a comparison with NoSQL databases' talks about the differences between the MongoDB with relational databases. It says relational database is in tabular format while the MongoDB is in key-value pair format. It tells the data in relational database is stored in tuples or rows whereas in MongoDB the data is stored in document format. MongoDB is also schema less and it provides indexing.

2.5 Online Booking System

The authors in 'Assessing the Online Outpatient Booking System (2017)' talks about the importance of booking system for patient for the smooth flow and can be used for appointment scheduling therefore reducing the overhead and the physical requirement to schedule the appointment. Therefore, we can use the same for our project and the main idea is to reduce the overhead here.

The authors of Pune university in their paper 'REVIEW ON HOSTELLER -A PLATFORM FOR FINDING AND BOOKING HOSTEL' have talked about the idea of helping the students/job seekers in their accommodation by removing the barrier of manual searching and in finding the best hostel. It also showed that most of the youth or students are moving out of their hometown for the best career often find difficulties in finding a proper accommodation, so a solution was required for this problem.

Few sites where we reviewed and found some problems-

- **OYO**: This is the online hotel booking system which provides excellent facilities to its customers.

Pros and cons: Smooth will all its functionalities, not dedicated for students in hostel booking.

- **Little Hotelier**: It is a cloud-based platform that allows users to book rooms and includes amenities such as food with their bookings. Pros and Cons: Good Channel Manager, but no payment customization.

- **Airbnb**: It is an American corporation that runs an internet marketplace for lodging, particularly homestays for vacation rentals, as well as tourism-related activities.

CHAPTER 3
TECHNICAL BACKGROUND

3.1 NextJS:

Built on top of Node.js, this open-source web development framework enables server-side rendering and the production of static websites in React-based online projects. React apps can only render content in the client-side browser, however Next.js extends this to include server-side applications. The NextJS enables one to quickly start building an application and provide a complete base setup.

3.1.1 Features:

- **Server-side rendering:**

Next.js has server-side rendering by default which helps in making an application optimized for search engines. It also helps in integrating middleware like express.js and hapi.js and also can also run any database such as MySQL or MongoDB.

- **Routers:**

When the create-react-app is used there is a need to install react-router and create its custom configuration. Next.js actually comes with its own routers and it also require zero configurations. You just need to create the page inside the pages folder, and it will take care of all the routing configurations.

- **Lazy loading:**

Lazy loading makes the application to have a better user experience. The page sometimes takes more time to actually load due to which the user may leave the app is loading takes more time.
Lazy loading or code splitting is one of the features that allows to deal with, control and load the only part of the page that is important.
Next.js has its own splitting method. The method provided is called dynamic, to load the component.

3.1.2 Why Next.js?

- NextJS can create high-performing web applications and super-fast static websites. It is extremely beneficial to User Experience and Search Engine Optimization (SEO).
- For business owners, Next JS provide unique user experience, adaptability and responsiveness, data security, faster time to market and support on demand.
- For developers, it brings many benefits like reusable components, built-in image component and automatic image optimization, community support, fast refresh, and TypeScript support.

3.2Express.js:

- Express is a minimum and flexible NodeJS net application framework that provides a strong set of features for net and mobile programs. It is an open supply framework advanced and maintained by using the NodeJS basis.
- Express presents us the tools which are required to construct our app, be it unmarried-web page, multi-page, or hybrid internet applications. It is bendy as there are various modules to be had on npm(NodePackage Manager), which may be directly plugged into Express.
- Unlike its competitors like Rails and Django, that have an opinionated manner of building applications, Express has no "high-quality manner" to do something. It may be very bendy and pluggable.
- Pug (in advance known as Jade) is a terse language for writing HTML templates. It generates HTML and allows for dynamic coding and code reuse (DRY). It is one of the maximum famous template languages used with Express.
- Express may be thought of as a layer built at the top of the NodeJS that enables manipulate a server and routes. It lets in customers to setup middleware to respond to HTTP Requests and defines a routing table which is used to carry out distinctive actions based on HTTP technique and URL.
- Express allows you to dynamically render HTML pages using template arguments.
- Express is asynchronous and single threaded and performs I/O operations speedy.

3.2.1 Why Express?

- Ultra-rapid I/O.
- Asynchronous and unmarried threaded.
- MVC like structure.
- Robust API makes routing clean.

3.3Heroku:

Heroku is a platform-as-a-service cloud platform that supports a variety of programming languages. Heroku, one of the first cloud platforms, has been under development since June 2007 and only supported Ruby at the time· Java, Node.js, Scala, Clojure, Python, PHP, and Go have all been added to the list of supported languages. As a result, Heroku is known as a polyglot platform since it allows developers to build, execute, and grow programmes in a consistent manner across multiple languages. Salesforce purchased Heroku in 2010.

3.4MongoDB:

- MongoDB is a move-platform document-orientated NoSQL database used for high volume data storage that gives excessive overall performance, high availability, and easy scalability.
- MongoDB shops records in bendy, JSON-like files, that means fields can range from document to report and records shape can be modified over the years. The file model maps to the objects within the software code, making records clean to work with.
- The statistics model available inside MongoDB allows users to represent hierarchical relationships, to save arrays, and different more complicated structures extra without problems.
- MongoDB works on idea of collections and files. Each database carries collections which in flip includes files. Each document can have various number of fields. The size and content of each record also can be one-of-a-kind from every different.

3.4.1 Key Components of MongoDB Architecture:

- **ID:** This is a 24-digit precise identifier field required in every MongoDB record in the collection. The _id field is just like the report's number one key. If the person creates a new document without an _id area, MongoDB will routinely create the field.
- **Collection:** The term "collection" refers to a group of MongoDB documents. It's the same thing as an RDBMS table. A collection exists within a single database. Collections do now not put in force a schema. Typically, all documents in a collection are of similar or associated reason.
- **Document:** A file is a hard and fast of key-cost pairs. Documents have dynamic schema. Dynamic schema approach that documents inside the identical collection do now not want to have the equal set of fields or shape, and commonplace fields in a group's files may additionally preserve exceptional types of records.
- **Database:** Database is a bodily field for collections. Each database gets its personal set of

files on the record device. A single MongoDB server typically has a couple of databases.

- **Field:** A name-value pair in a record. A report has zero or greater fields. In relational databases, fields are similar to columns.

3.5 API

Application Programming Interface (API) allows two applications to transfer data between them. For example- when user uses an application on mobile phone connected to the internet, the application will send the data to the server. The server will receive the data interprets it and perform the necessary action and will send it back to mobile. The application will display you the information by interpreting the data in readable format. This is all because of API.

3.5.1 Types based on level of access and scope of use

- **Open APIs:**

Also known as public APIs or external APIs which can be used by any developer. This results in the less security, authentication, and authorization.

- **Partner APIs:**

Here the APIs are shared externally but only to the specific clients. Because access is restricted to authorized clients with official licenses, security is enhanced.

- **Internal APIs:**

The access in this is not allowed by any third-party client. This makes it the most secure API and is generally used by developers working in a company.

- **Composite APIs;**

Composite APIs bring together numerous APIs, allowing developers to bundle calls or requests and obtain a single unified response from multiple servers. A composite API is used when you need data from multiple apps or data sources.

3.5.2 Types of API architectures

- **REST**

REST stands for Representational State Transfer. Majority of web APIs are built on REST. It is a collection of guidelines for APIs that are scalable, lightweight, and simple to use.

- **SOAP**

It stands for Simple Object Access Protocol. The World Wide Web Consortium(W3C) has standardized SOAP. It utilizes XML to encode data.

- **RPC**

It stands for Remote Procedural Call. In contrast to REST and SOAP, which permit data transfer, RPC APIs initiate processes.

REST	SOAP
Stands for Representational State Transfer	Stands for Simple Object Access Protocol
REST is an architectural style in which a web service may only be considered RESTful if it adheres to certain constraints of being 1. Client Server 2. Stateless 3. Cacheable 4. Layered System 5. Uniform Interface	SOAP is a protocol. It comprises a WSDL file that contains the necessary information about what the web service does as well as its location.
SOAP can be used by REST as the underlying protocol for web services.	The REST cannot be used by SOAP as SOAP is a Protocol and REST is an architectural pattern.
REST allows different data formats such as plain text, HTML, JSON, etc. But JSON is the most preferred one.	SOAP only allows XML format for data passing.

Table 3.1 REST vs SOAP

CHAPTER 4

PRODUCT IMPLEMENTATION

The functionality of the application is to give the ability to book PG/Hostel rooms online. The users will be a small group for now but can be scaled up once needed.

4.1 Users

This section will talk about the users. There are 2 types of users-

- Owner
- Students (or someone who wants to book the room)

Based on the type of users there are different functionalities assigned to them.

4.2 Requirements

This defines the set of features that are required in the web Application. It can be divided into 2 parts-

4.2.1 Functional Requirements

- **Login/ Log-out**

The user can easily login or log-out and is set such that the user will automatically get logged out after one hour.

- **Booking Hostel**

The student or anyone who wants to book the room can choose the hostel based on the facilities, rent and location and can press the book button which will generate the request to the owner. Owner gets a choice whether to accept or reject it and if the owner accepts the

request the owner needs to enter the room number which he wants to a lot him/her.

- **Adding New Hostel**

This must be available to the owner where he can click on '+' icon to add a new hostel. He needs to upload the image (only one as of now) fill all the required fields like name, city, number of rooms, rent and location (manually by adding the longitude and latitude). After clicking on the add button the owner will get a message if it is added successfully or not.

- **Search Hostel**

The users can search for a hostel based on the name or on the location. This can be accessed by the clicking on the search icon on the top right. This will also have a map where the user can see the hostel location on the map.

- **Search Student Details**

The owner should have the access to this functionality wherein the owner can select the hostel and search a particular room based on the room number and it will show the student's detail (name, college ID, Aadhar number).

4.2.2 Non-Functional Requirements

- Compatibility- The web application must work on any device and operating system with a browser and an active internet connection.
- Availability- The access to the application must be to different user and at every time.
- Reliability- The system must be reliable enough to handle the different situations
- Scalability- The system must be scalable to handle the large traffic or to store more data.

4.3 Interface

The interface used here is simple easy to handle and self-explanatory.

Once opened that user will be able to log in or register based on his choice and after logging in or registering, the user will be on dashboard.

The dashboard has all the hostel listed, search icon and profile tab where he has notification and logout option.

CHAPTER 5
DESIGNING AND ARCHITECTURE

The designing started off by designing the flowchart of the system.

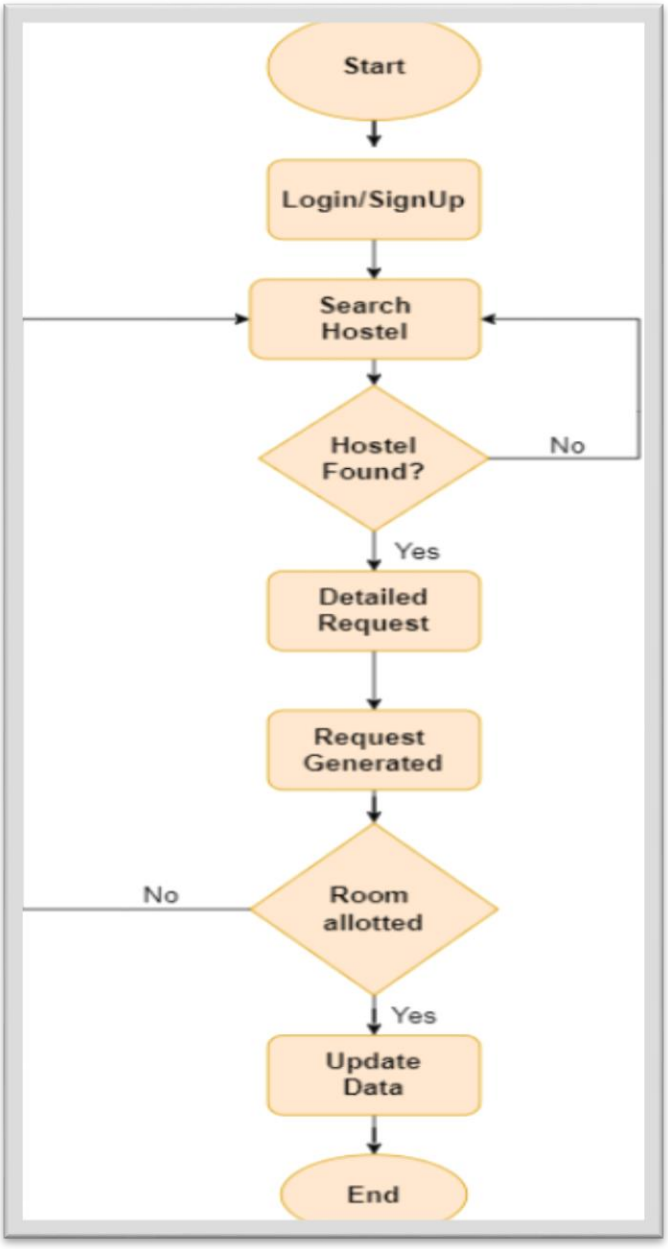


Figure 5.1: Flow chart of the application

This flowchart defines the basic level of operations that are to be performed by the designed system.

5.1 Frontend

- Language used – Next.js, TailwindCSS
- Deployed on – Vercel

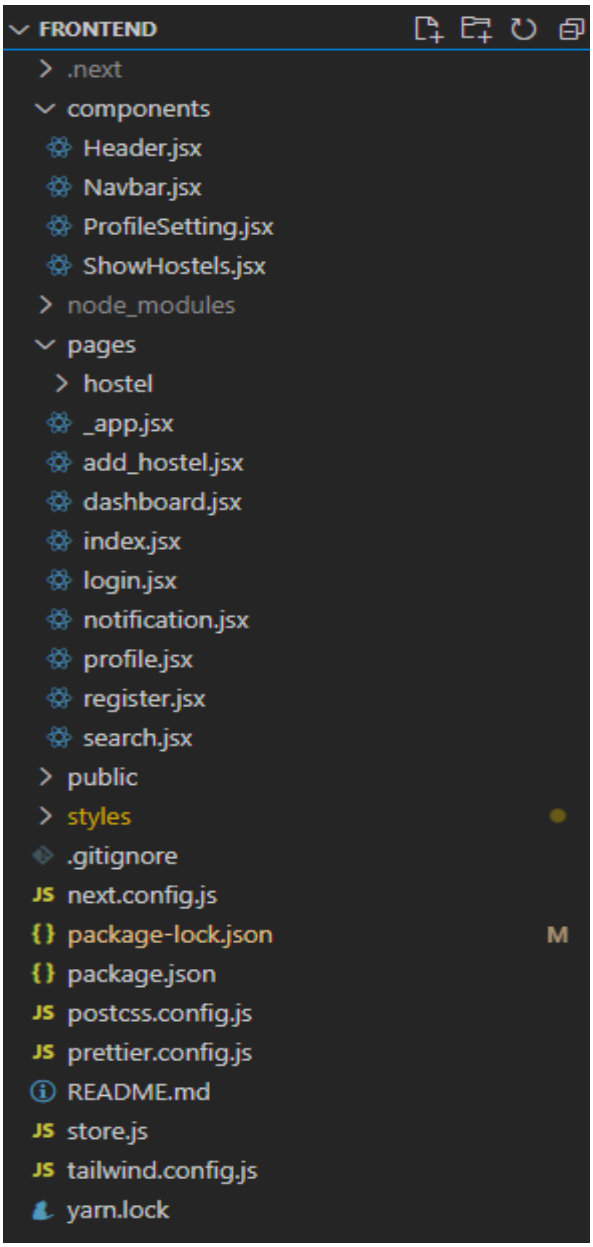


Figure 5.2: Front-end folder view

Components are the building blocks of this frontend part of the application. It is a JS class or function that accepts inputs (optional) that is properties(props) and it returns the element which tells how a section will appear in UI.

A package.json file (fig 5.3)

- Lists the packages your project depends on.
- Specify the version of the package that are used in the project
- Different dependencies used here are axios, react-google-maps etc.

Figure 5.3 package.json file (frontend folder)

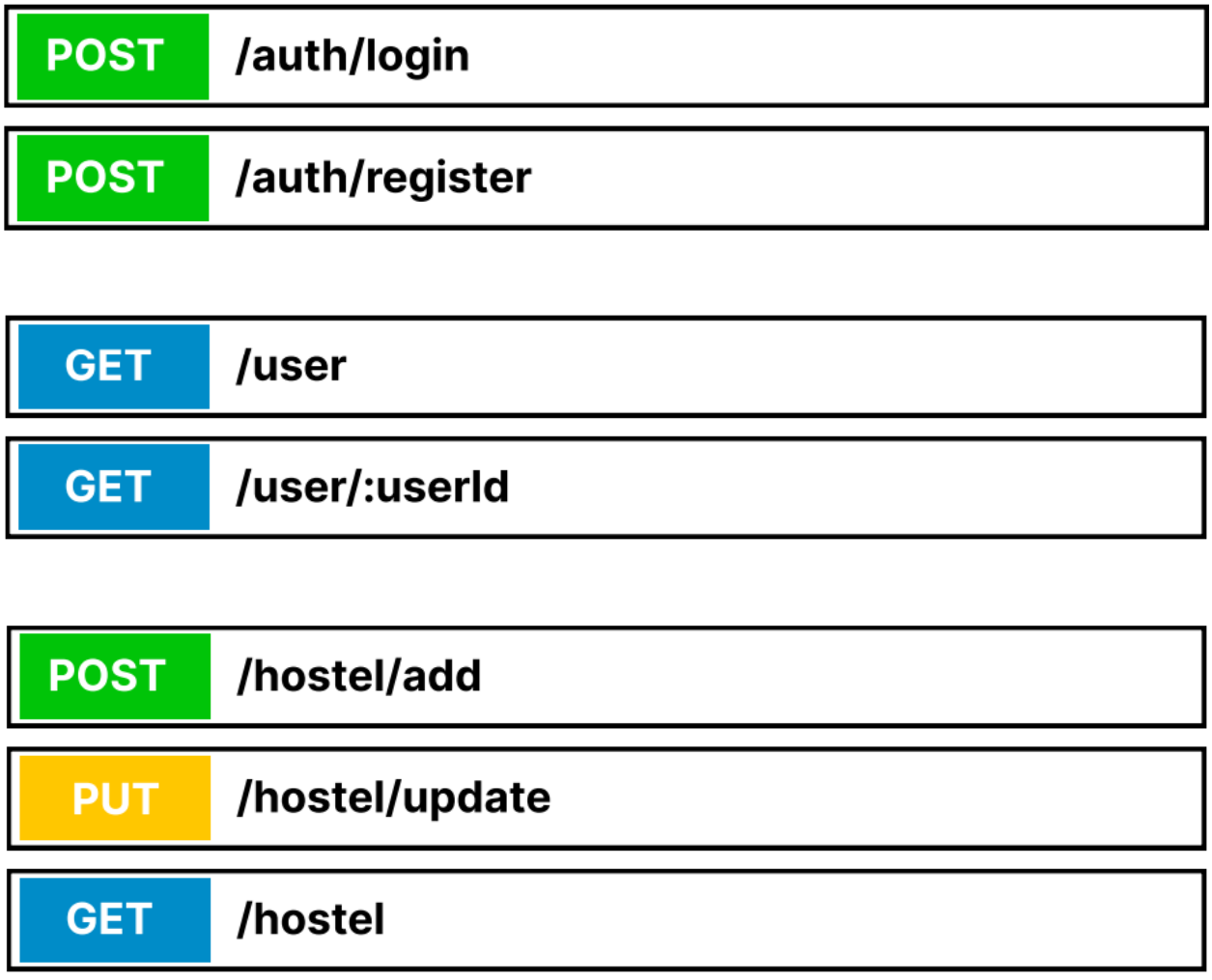
5.2 Backend

- Language used- Express.js
- Deployed on- Heroku

5.2.1 API calls and Routes-

The REST APIs is used here wherein there are multiple methods, but we have used mainly three of them that are-

- GET – to retrieve the data
- POST – to create a new data
- PUT – to update an existing data



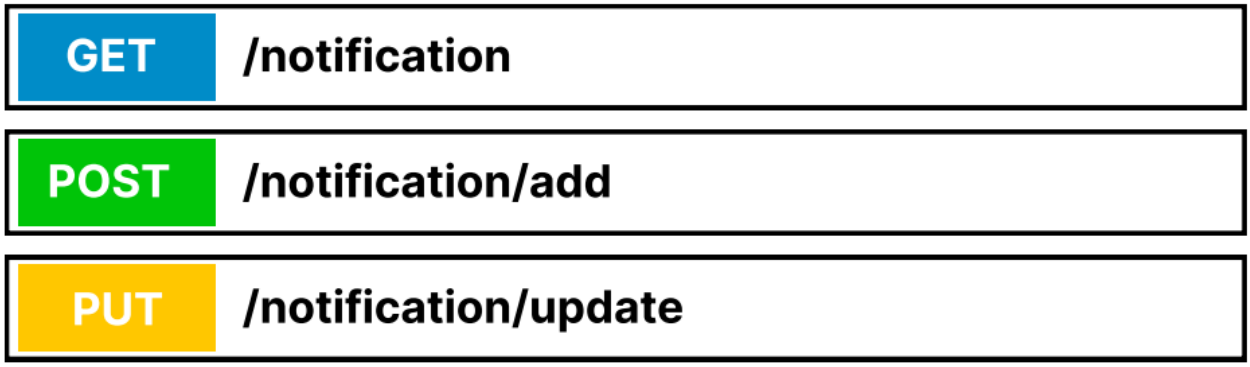


Figure 5.4: Required routes

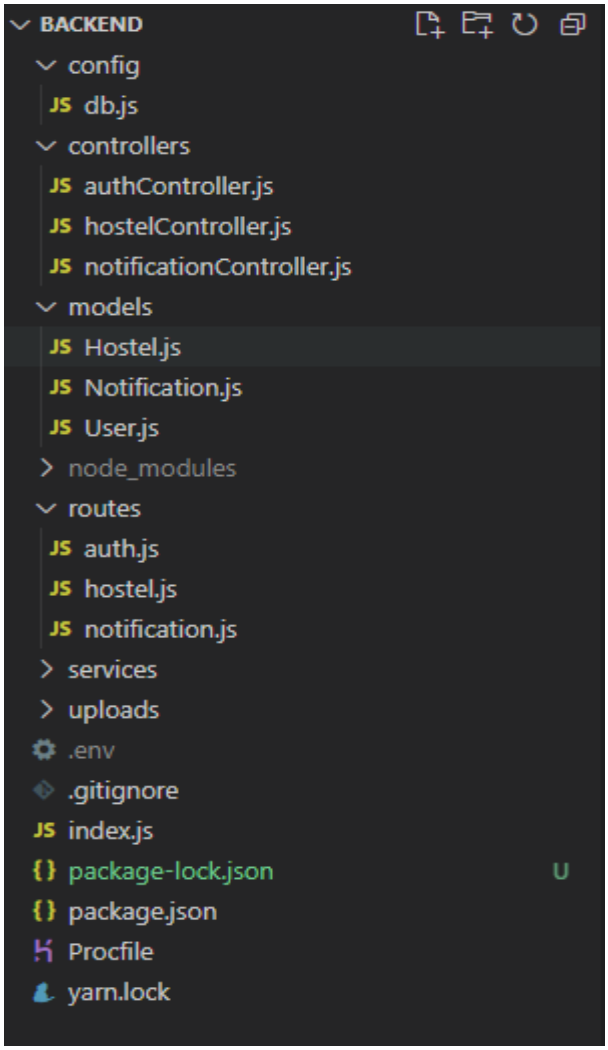


Figure 5.5: Backend Folder View

5.2.2 Designed Components

Here there are three main components-

- Controller- Here different functions are defined which will get executed whenever API calls are made.
- Models- Here the schema are defined for user, hostel, and notification.
- Routes- Here the API calls are made to different routes and the functions defined in the controllers are used.

Here the config folder has db.js which is used to connect to the DB. (MongoDB is used)

A package.json file (fig 5.6)

- Lists the packages your project depends on.
- Here the different dependencies are used like express, mongoose etc.

Figure 5.6 package.json (backend)

5.3 Database

- Database used- MongoDB

The fig 5.7 explains how the database is connected to our application.

```
db.js  M
config > db.js > ...
1   const mongooose = require("mongoose");
2
3   mongooose.connect(
4     //   "mongodb://localhost/test",
5     "mongodb+srv://test:test@cluster0.qhczt.mongodb.net/myFirstDatabase?retryWrites=true&w=majority",
6     {
7       useNewUrlParser: true,
8       useUnifiedTopology: true,
9     },
10    (err) => {
11      if (err) {
12        console.log(err);
13      } else {
14        console.log("Connected to mongodb");
15      }
16    }
17  );
18  module.exports = mongooose;
19
```

Figure 5.7 Connecting database

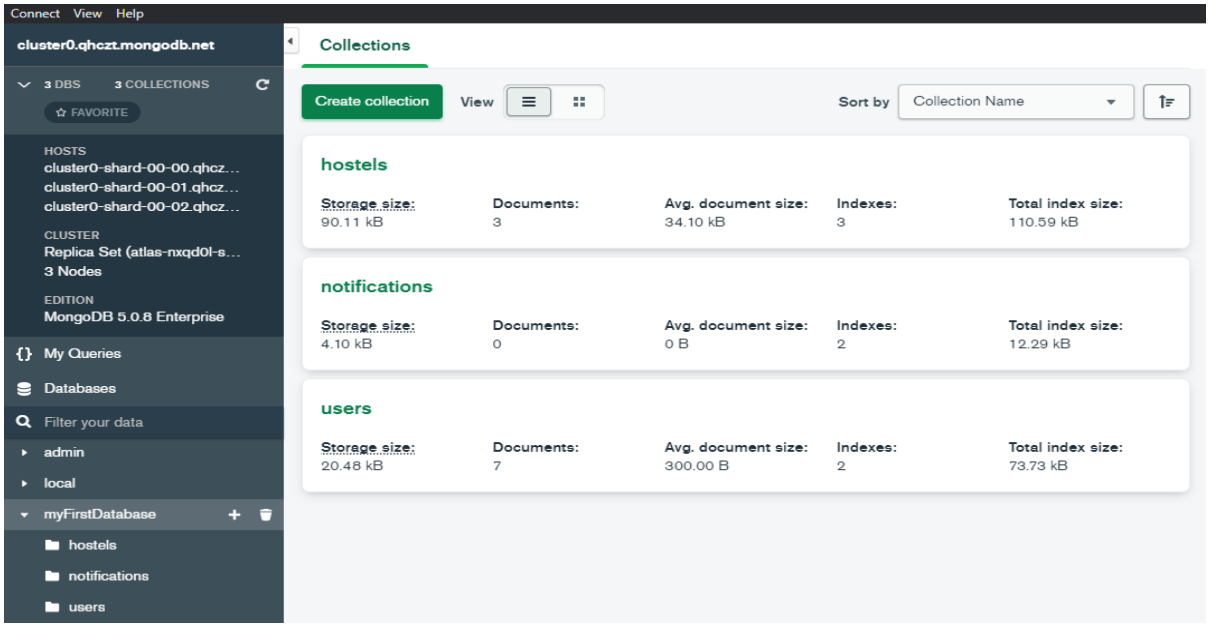


Figure 5.8 Database View

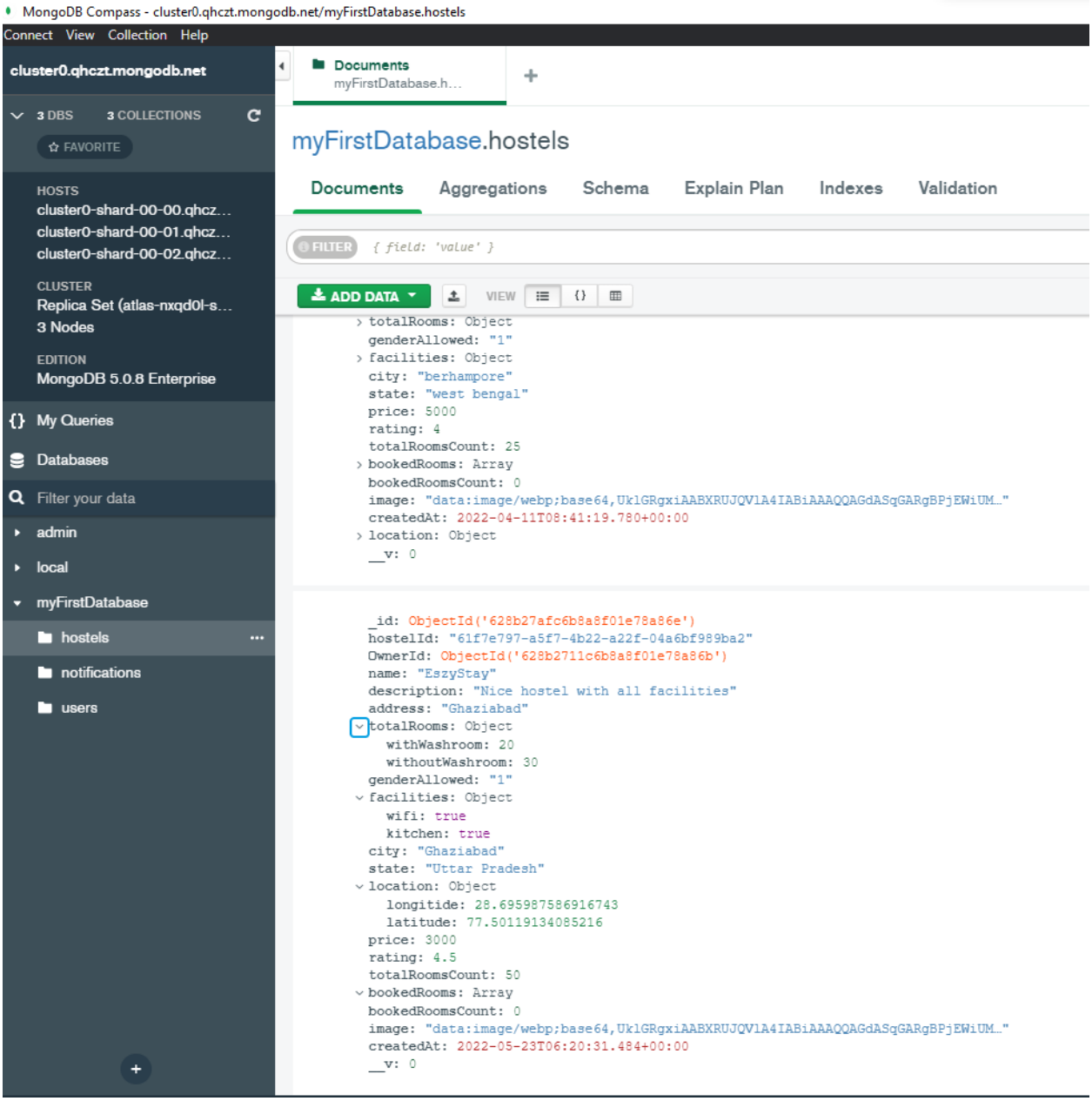


Figure 5.9 Hostel Object in database

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 Conclusion

The application acts as a link between the user and the hosts. This combines basic amenities for users, particularly students (seekers), on a single platform. This application will be beneficial to all students because it will provide them with a portable all-in-one application. None of the existing system's apps enable a user-friendly environment where all the needed capabilities are unified into a single integrated platform. There are numerous conclusive aspects on the website that indicate that it may be further developed, and a business outlook can be made using various hosting platforms. It's even more impressive when cloud services are included. The combination of these platforms can create a subtle environment in which a user can consume less data while saving time. The website's portability and ease of use will contribute to its continued development in the future. This website brings together all day-to-day concerns that can be used as a business concept. This website has the potential to be a business complement in the long run. This application not only addresses issues, but it also considers the preferences or choices of customers who are utilizing it in a new place. To provide students with more options and to eliminate the tedious processes associated with hostel booking, we developed a solution based on technologies and libraries such as React JS, Next JS, Node JS, and cloud computing.

6.2 Future Scope

6.2.1 Future scope of the application

As this is the first version of the application, there is a scope of improvement in different areas like:

- **Scalability**

The application can be scaled to multiple users because of the cloud. In addition to that the database size can also be increased to store in more information.

- **Improving UI and user experience**

The UI and user experience also can be improved. The paid cloud services can be bought to lower the uptime and make application faster. Similarly, the UI can also be change based on the recommendation and research by the developer team and the users.

- **Features**

More features can be added or improved in the application like the integration of payment system, maps feature also can be improved, addition of multiple images of the hostels, integration of review and rating system (text, photo, or video), help and support for the users, etc.

6.2.2 Scope of extension in use case of the application

The similar idea can also be used in various fields like in healthcare sector where the patient will be able to see whether there is space or bed available in the hospital. As the people are mostly working in new locations so they are unaware of various hospitals, and it will also be more of relief to the patient as the travel time can be reduced by going directly to the hospital which is having space or bed available. This time can save someone's life, as the treatment can start in time.

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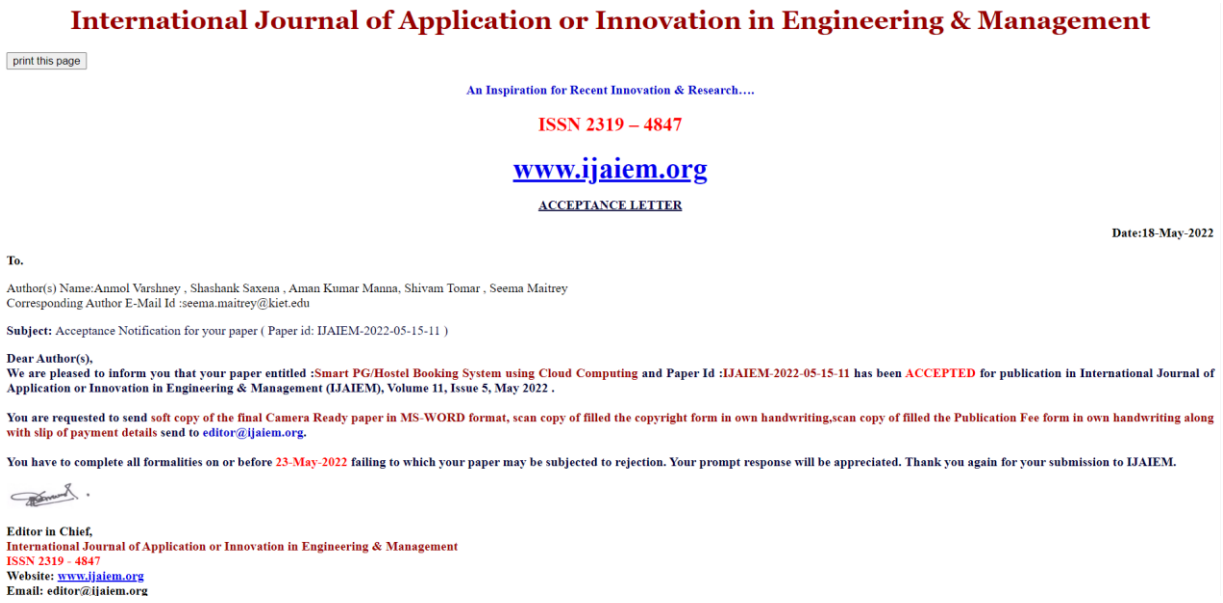
ANNEXURE 1

The research paper was submitted in 'International Journal of Application or Innovation in Engineering & Management' and was accepted on 18th May 2022 and the payment is done for the publication of the research paper.

Acceptance Letter



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ACCEPTANCE LETTER

Date:18-May-2022

To.

Author(s) Name:Anmol Varshney , Shashank Saxena , Aman Kumar Manna, Shivam Tomar , Seema Maitrey
Corresponding Author E-Mail Id :seema.maitrey@kiet.edu

Subject: Acceptance Notification for your paper (Paper id: IJAIEM-2022-05-15-11)

Dear Author(s),
We are pleased to inform you that your paper entitled :Smart PG/Hostel Booking System using Cloud Computing and Paper Id :IJAIEM-2022-05-15-11 has been ACCEPTED for publication in International Journal of Application or Innovation in Engineering & Management (IJAIEM), Volume 11, Issue 5, May 2022 .

You are requested to send soft copy of the final Camera Ready paper in MS-WORD format, scan copy of filled the copyright form in own handwriting,scan copy of filled the Publication Fee form in own handwriting along with slip of payment details send to editor@ijaiem.org.

You have to complete all formalities on or before 23-May-2022 failing to which your paper may be subjected to rejection. Your prompt response will be appreciated. Thank you again for your submission to IJAIEM.

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ANNEXURE 2

RESEARCH PAPER

Smart PG/Hostel Booking System using Cloud Computing

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Abstract

It is very simple to find PG accommodation near your office. It was difficult in the past to travel to a place to work that was located over great distances, and as a result, we had to miss out on wonderful possibilities because we didn't know where to stay and were unfamiliar with a certain city. However, it is now much easier to obtain affordable lodging near the workplace. The Hostel Booking System is a web-based application for booking hostels for individuals. This will reduce manual labor and make hostel assignment considerably simpler for students and hostel administrators. It keeps track of data in a database and retrieves it as needed. We design this system for the ease and welfare of person seeking for residence when they are away from their hometown. The designed system is more user-friendly, GUI focused, reliable, efficient, and secure with access control mechanisms, overcoming the drawbacks of manual hostel management. Educational systems have been impacted by outdated techniques that have limits. As a result, we're working on one. Cloud computing technologies will be used. A web app will be built that will run on both IOS and Android, considering all the requirements specific to the hostel.

Keywords: Cloud computing, Load Balancer, Stateless design, Database.

1. Introduction

The students coming from far off cities and towns often find it difficult to find the right accommodation for themselves. They aren't aware of which rooms are available for rent as many don't even put the "Room for Rent" boards outside their houses. So, either they must compromise with the basic facilities they require like room size,

clean environment, security, water, electricity and mess facilities or they get it at higher prices. Also, they are unaware of the surrounding they are living in. Also, this COVID situation has made it more difficult to visit every location. The main idea of developing this project is to ease the students. This Web Application will help to overcome the entire problem which they are facing currently by making everything digital and easily accessible. We students will develop the PG/Hostel booking system, and we will use libraries, databases, and a variety of techniques to complete our project. React JS, Node JS, Cloud computing, and so on.

Basic idea behind this work:

Real life experiences:

Students or working people work hard to find the best accommodation near college premises or their workplace. They could only search for 2-3 hostels which were referred by their friends as they didn't know much about the locality and proper pricing of the room available. It is also for those who are paying higher than the facilities provided by the owner. They are the victim of the false promises like proper cleaning, hot and cold water, no extra bills, etc.

Reviewed other related websites/applications:

Various other related websites/applications are generally for hotel room booking or property dealing. There are not many applications that are dedicated to students only.

2. Literature Survey

We looked for numerous sites for a PG/Hostel booking system in this literature review and found a handful that were like what we required. We've mentioned the survey we'll use to do research for our project; with this survey, we'll be able to add to and update our project in stages. All four members of the group are assigned the task and the task is divided equally.

Below are the details of the sites of hostel booking system we have listed some of them:

- OYO: This is the online hotel booking system which provides excellent facilities to its customers. Pros and cons: Smooth will all its functionalities, not dedicated for students in hostel booking.
- Little Hotelier: It is a cloud-based platform that allows users to book rooms and includes amenities such as food with their bookings. Pros and Cons: Good Channel Manager, but no payment customization.
- Airbnb: It is an American corporation that runs an internet marketplace for lodging, particularly homestays for vacation rentals, as well as tourism-related activities.

3. Development-Requirements

3.1 ReactJS-

React JS is a JavaScript component-based framework [1]. Everything in React is a component, and they are usually JavaScript classes. React Declarative makes the code more predictable and makes creating complicated UIs easier [2]. React is adaptable, with hooks that let you connect to different libraries and frameworks. We'll be using more and more components as the application becomes more complicated, and data that must be shared between components will be passed down the component tree so that the state of each component is always updated with the required data.

3.2 NextJS-

Built on top of Node.js, this open-source web development framework enables server-side rendering and the

production of static websites in React-based online projects [3]. React apps can only render content in the client-side browser, however Next.js extends this to include server-side applications.[4] The NextJS enables one to quickly start building an application and provide a complete base setup.

3.3 Express-

Express is a Node.js web application framework that provides a wide range of features for web and mobile projects. It's open-source software that's been released under the MIT license [5]. The back-end component of popular development stacks like MEAN [6], MERN [7], or MEVN [8] is Express, which is used in conjunction with the MongoDB database software and a JavaScript front-end framework or library.

3.4 MongoDB-

MongoDB is a major NoSQL database and an open-source document database.[10] Indexing, replication, load balancing, file storage, and server-side JavaScript execution are some of the features.

3.5 Vercel-

Vercel is a frontend framework and static site platform designed to interface with your headless content, commerce, or database. It helps in maintaining and deploying the NextJS projects easily on its platform.

3.6 Heroku-

Heroku.[11]is a platform-as-a-service cloud platform that supports a variety of programming languages. Heroku, one of the first cloud platforms, has been under development since June 2007 and only supported Ruby at the time [12]. Java, Node.js, Scala, Clojure, Python, PHP, and Go have all been added to the list of supported languages. As a result, Heroku is known as a polyglot platform since it allows developers to build [13], execute, and grow programmes in a consistent manner across multiple languages. In 2010, Heroku was bought by Salesforce [14].

3.7 TailwindCSS-

Helps in building modern websites without ever leaving your HTML. A utility-first CSS framework packed with classes like rounding the pictures, setting a different font.

3.8 Future Developments-

- Weekly and monthly views
- Google Calendar
- Google Maps
- Reviews and rating

4. Proposed system: Planning and development

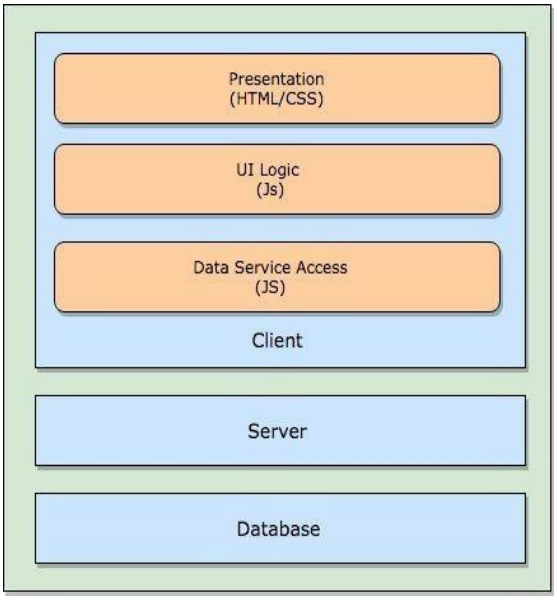

Figure 1 Client Server Architecture

- We started the planning phase by figuring out what the problem was and how the current system functioned. We also gathered information on what the new system should provide for the searchers. Then we looked at different booking systems on hotel websites and booking systems for rooms.
- We next started thinking about what documents and fields the database would require. We started figuring out how we could best present the data while designing the ERD to avoid the challenges that the seekers have with the current system. Figma was used to create the prototype.
- We started by listing all duties and assigning work to each team member.

4.1. NextJS-

- NextJS can create high-performing web applications and super-fast static websites. It is of great use for User Experience and Search Engine Optimization (SEO) [15].
- For business owners, Next JS provide unique user experience, adaptability and responsiveness, data security, faster time to market and support on demand [16].
- For developers, it brings many benefits like reusable components, built-in image component and automatic image optimization, community support, fast refresh, and TypeScript support [17].

4.2. Deployment of front-end –

Here the front-end is hosted in 'Vercel' as the Vercel has the copyrights and trademark of next.js which also maintains and leads this open-source web development framework. Vercel provides and maintains the hosted front-end and lets the user focus more on designing the front-end rather than worrying about hosting and maintaining it.

4.3. Express JS-

- Express.js makes development of node.js web application fast and easy.
- It is easy to customize and configure.
- Express.js helps to scale up the application quickly.
- It also has the advantage of lower development and maintenance costs. It is compatible with the Google V8

engine, which allows for increased processing speed without latency or errors.

- It also has a strong community, enables caching, and is simple to integrate with a variety of third-party applications and services.
- It is easy to connect express.js with databases such as MongoDB, MySQL.

4.4. Deployment of back-end –

Heroku is used here as deploying on Heroku is easy and convenient and it helps to focus on the code and structure it rather than worrying about creating, maintaining, and managing the deployed platform.

4.5. Why cloud for back-end and database?

- We used cloud to deploy the backend because cloud platforms help in easy scalability and load balancing. Heroku is used here which provides platform as a service (PaaS).
- Cloud [18] provides with the easy scalability by simply buying their higher plan for more servers or more traffic.
- Cloud also helps in reducing the cost as you only need to pay for only the services you are using and there is no/less hardware cost included.
- There is also no need for the dedicated team/staff for managing the hardware and software and also for security.
- Cloud also provides with the high availability and remote access to the users.
- Heroku has different components which helps to achieve various benefits of using the cloud. Load balancer is the most important.
- Here we also used the cloud for our database. We used MongoDB, where the Database-as-a-Service is used which helps in accessing data anytime and anywhere as the database hosted in cloud. It has upper hand in handling the failure of any site.

4.6. Tailwind CSS-

Tailwind CSS [19] is used to build the front-end as Tailwind helps in creating the front-end without worrying about the separate CSS file and integrating it into the original design. It also helps in removing the unused CSS when it is build for the production purpose, so that the final bundle is as small as possible. It is also responsive in nature.

4.7. Stateless Design-

To make sure our services are scalable, we need to make sure we build them in a stateless manner. By stateless, we mean that the service keeps no state from prior calls and treats each request as if it were completely new [20]. The benefit of this technique same service and ensure that the request is handled by the correct service instance.

4.8. Load Balancer-

A load balancer is a device that helps in distributing the application or network traffic across different servers. A load balancer is placed between the client and the server farm that accepts the traffic and distribute is across multiple servers. This helps in reducing the individual server load and in preventing from any failure due to single point server failure [21][22].

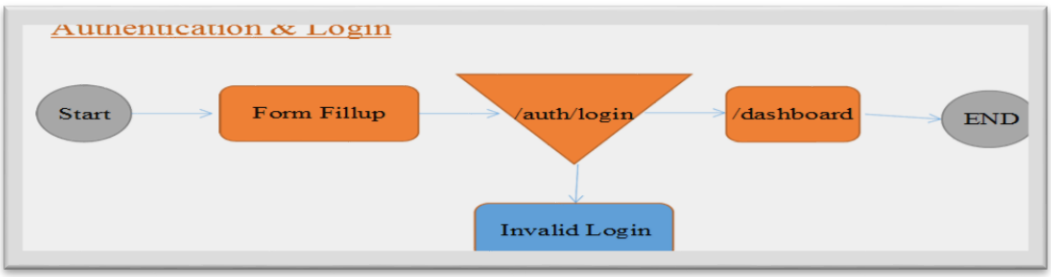

Figure 2 Flow diagram of Authentication and Login Module

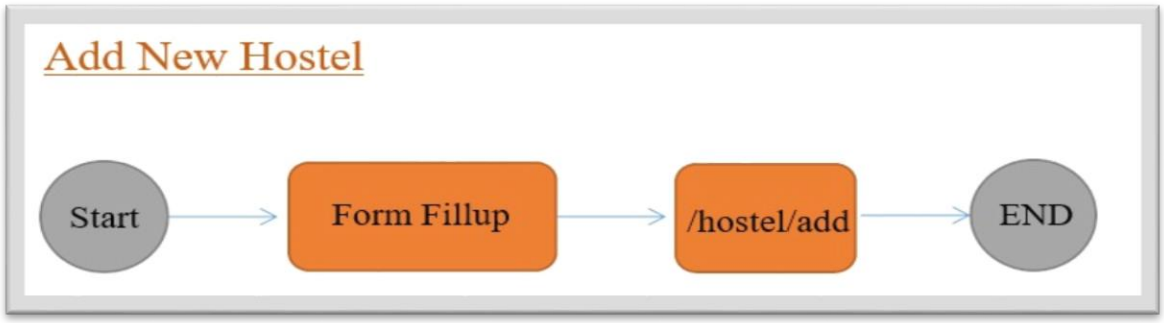

Figure 3 Flow diagram of Adding New Hostel Module

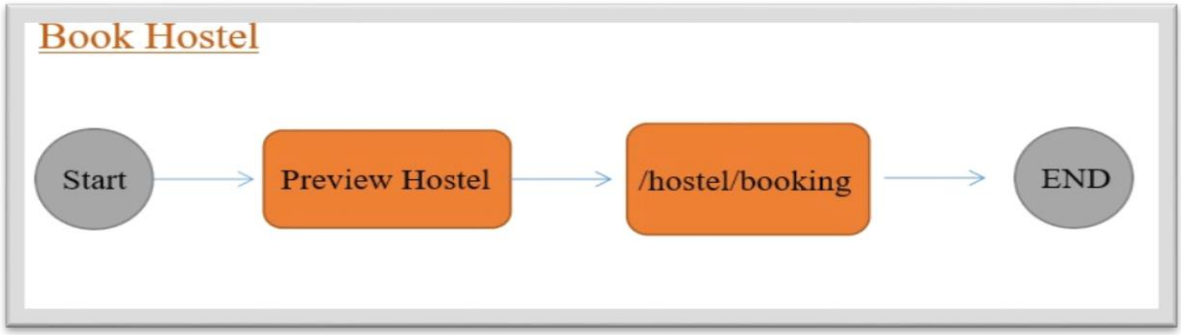

Figure 4 Flow diagram of Booking Hostel Module

Each step involved in the development of such idea can be depicted in the following manner:

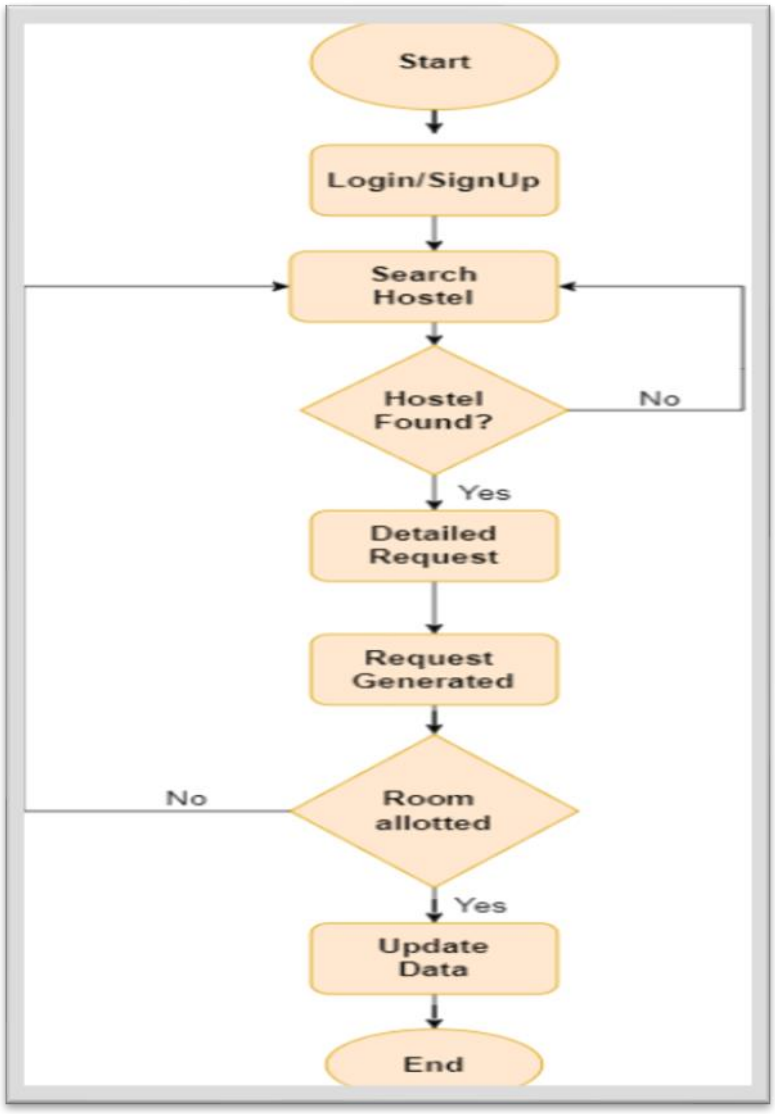

Figure 5 Flow chart of the application

The application was created to be an easy and intuitive way to navigate, analyze and generate bookings. This, in turn, allows for the most efficient use of resources.

Conclusion

The application acts as a link between the user and the hosts. This combines basic amenities for users, particularly

students (seekers), on a single platform. This application will be beneficial to all students because it will provide them with a portable all-in-one application. None of the existing system's apps enable a user-friendly environment where all the needed capabilities are unified into a single integrated platform. There are numerous conclusive aspects on the website that indicate that it may be further developed, and a business outlook can be made using various hosting platforms. It's even more impressive when cloud services are included. The combination of these platforms can create a subtle environment in which a user can consume less data while saving time. The website's portability and ease of use will contribute to its continued development in the future. This website brings together all day-to-day concerns that can be used as a business concept. This website has the potential to be a business complement in the long run. This application not only addresses issues, but it also considers the preferences or choices of customers who are utilizing it in a new place. To provide students with more options and to eliminate the tedious processes associated with hostel booking, we developed a solution based on technologies and libraries such as React JS, Next JS, Node JS, and cloud computing.

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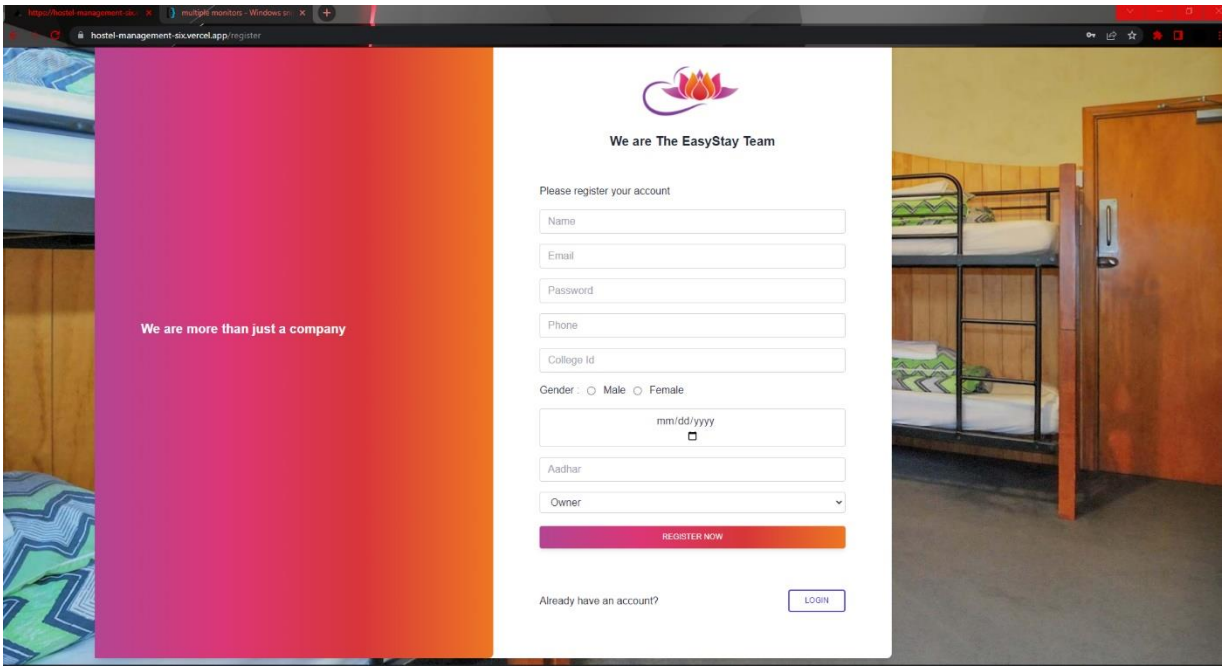
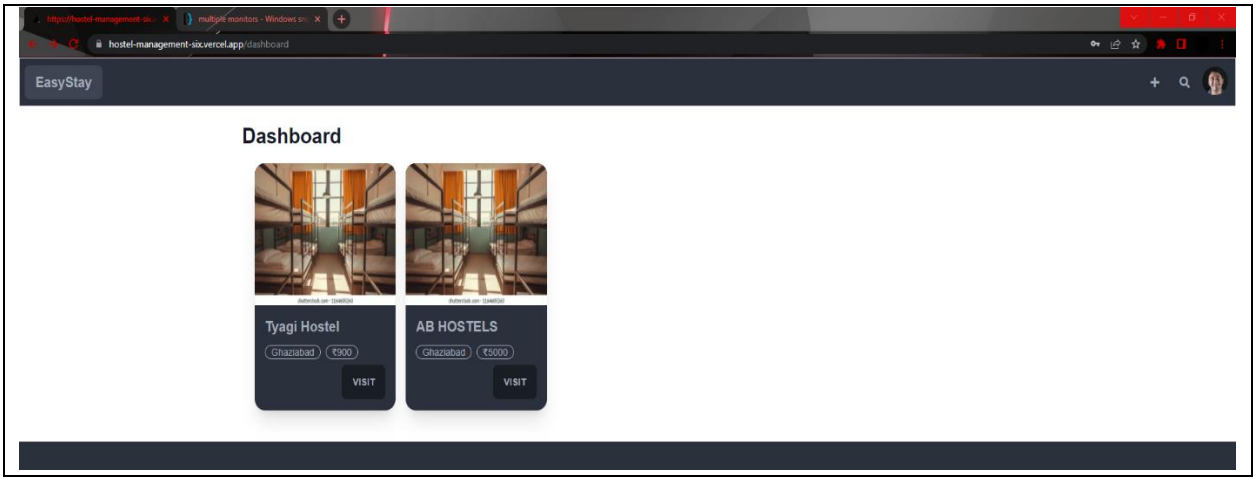
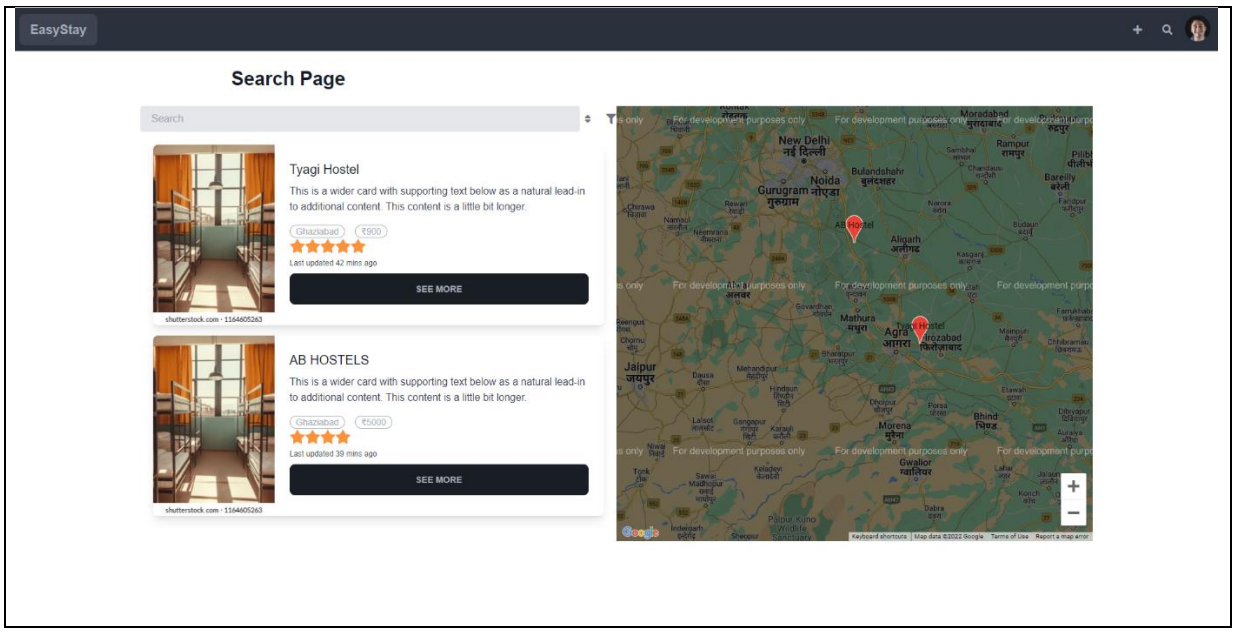
ANNEXURE 3

SNAPSHOTS OF THE WEB APPLICATION



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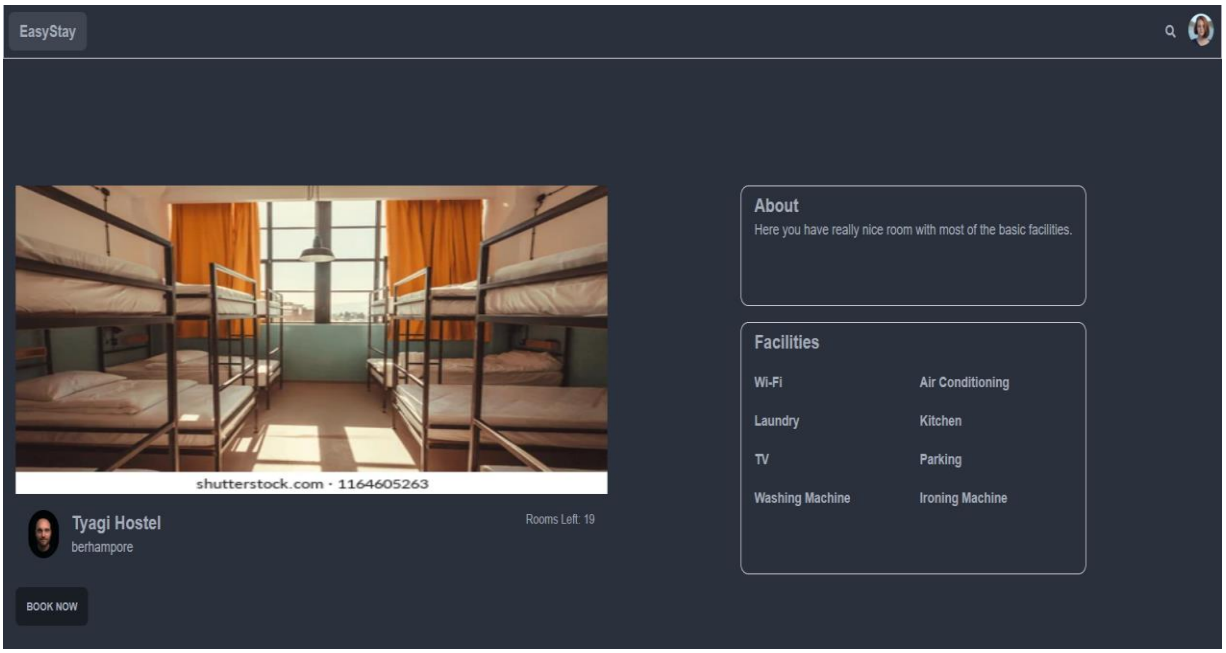
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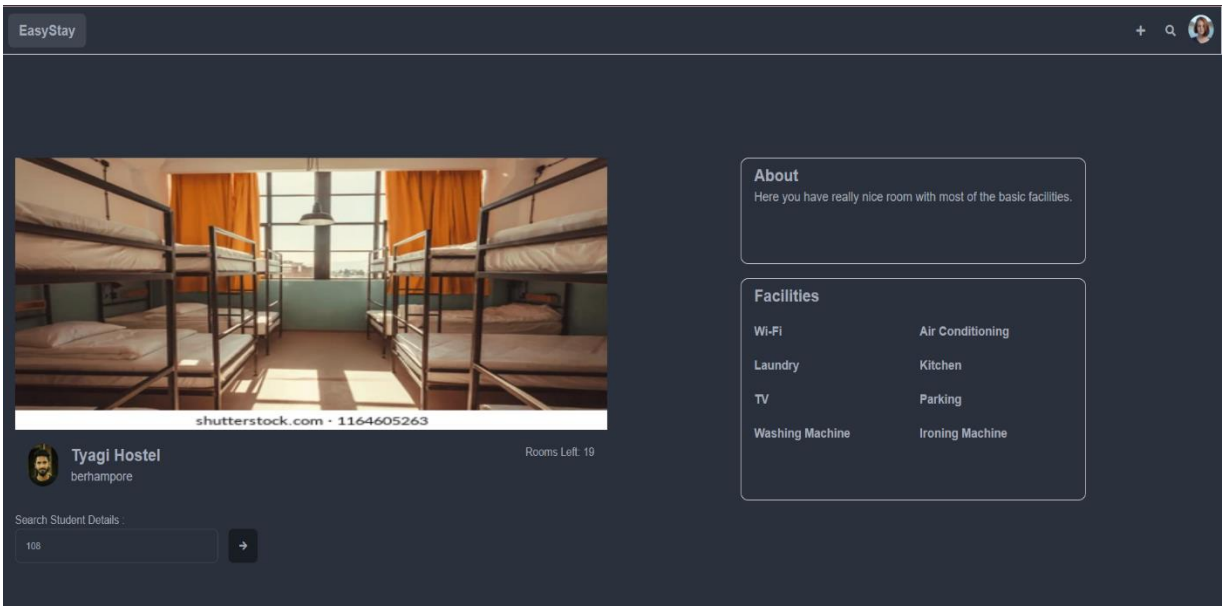
Laundry
Kitchen
TV
Parking
Washing Machine
Ironing Machine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Laundry
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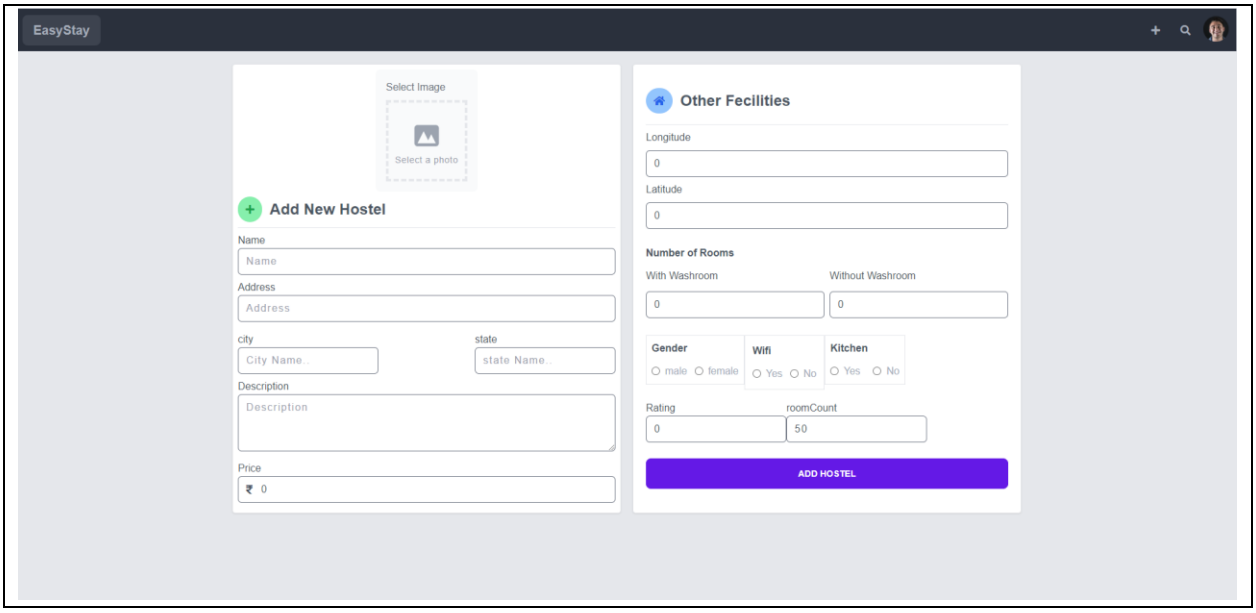
Parking
Washing Machine
Ironing Machine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Price
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Longitude
Latitude
Number of Rooms
With Washroom
Without Washroom
Gender
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female
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Kitchen
Yes
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Rating
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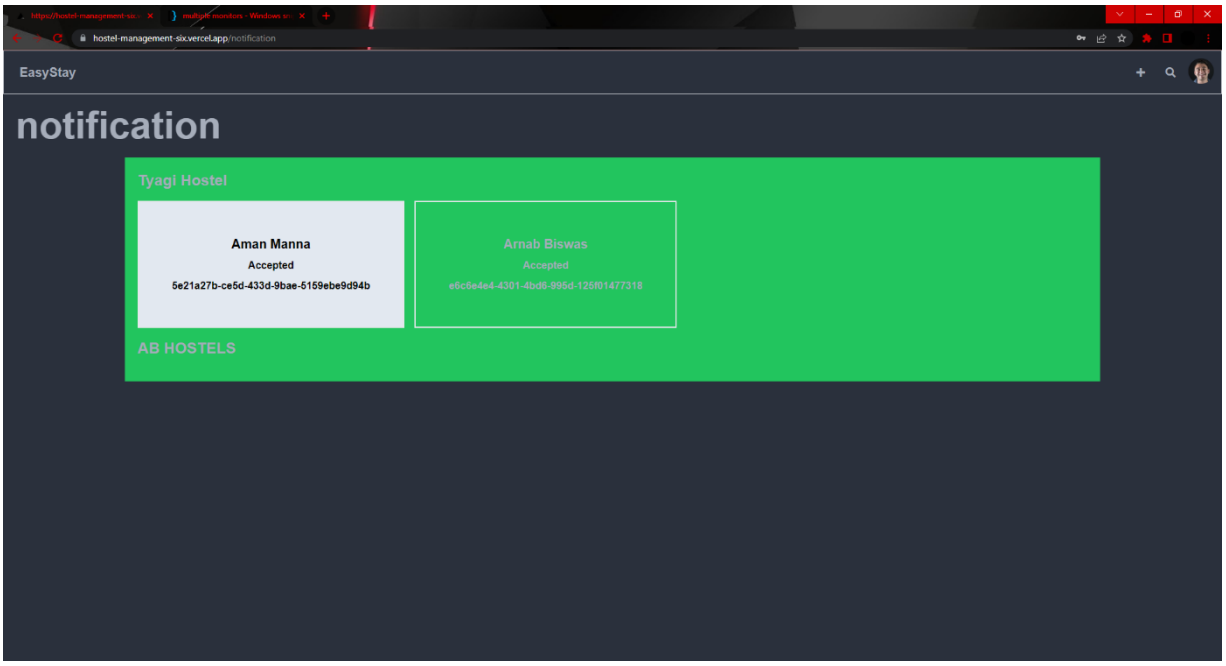
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