SOFTWARE ENGINEERING

PROJECT REPORT

Project Title
Online LHC room booking system.

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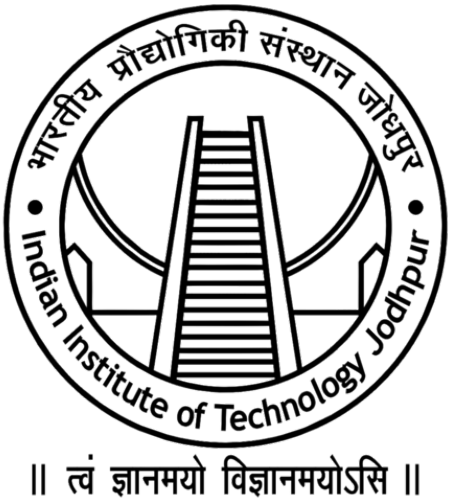
Document Type
Test Case Design and Automation Script



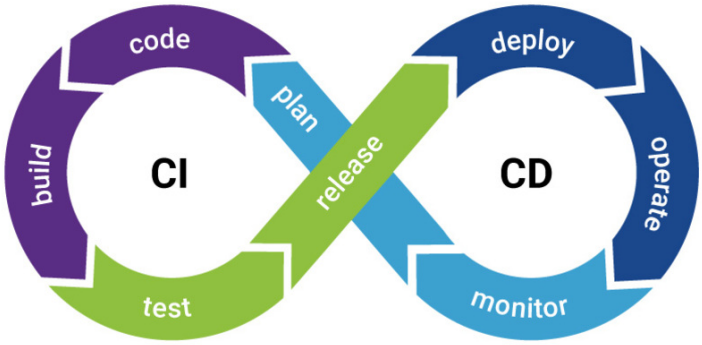
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
IIT JODHPUR

AUTOMATION SCRIPT

For the automation script we had decided to run a CI/CD pipeline which fully automates all the processes.

What is CI/CD pipeline and how we used it.

In software engineering, CI/CD or CICD generally refers to the combined practices of continuous integration and either continuous delivery or continuous deployment. CI/CD bridges the gaps between development and operation activities and teams by enforcing automation in building, testing and deployment of applications.



PIPELINE BUILD

Chosen Software - LHC Room Booking System
Github Link - SE_Project

We had used two automation script methods to test our software which are:

- Fake data generation
- Github actions

Method 1 - Generating fake data to test the software

We have written a script in javascript which was used in the starting phase of development to run the software. The data generated was used to display the rooms along with the capacity. The room numbers were labelled numerically and randomly. The capacity of the room was also assigned randomly from within the range 0 to 8. We named

3 random locations which were allocated randomly to the rooms. The script generated a .json file which contains a javascript object with all the information about the rooms.

```
// Randomly generate a fake allTables JSON file

const fs = require('fs');
const numRooms = Math.floor(Math.random() * 10) + 16; // 16 - 26 (exclusive)

const fakeRooms = [];
for (i = 1; i < numRooms; i++) {
   const chairs = Math.floor(Math.random() * 6) + 2; // 2-8 (exclusive)
   const name = `Room ${i}`;
   // const availability = [true, false][Math.round(Math.random())];
   const location = ['Patio', 'Inside', 'Bar'][Math.floor(Math.random() * 3)]; // 0-3
(exclusive)
   fakeRooms.push({
       name: name,
       capacity: chairs,
       // isAvailable: availability,
       isAvailable: true,
       location: location,
   });
}

const data = JSON.stringify({
   rooms: fakeRooms,
});
fs.writeFileSync(__dirname + '/allRooms.json', data);
```

Method 2 - CI/CD pipeline using github actions

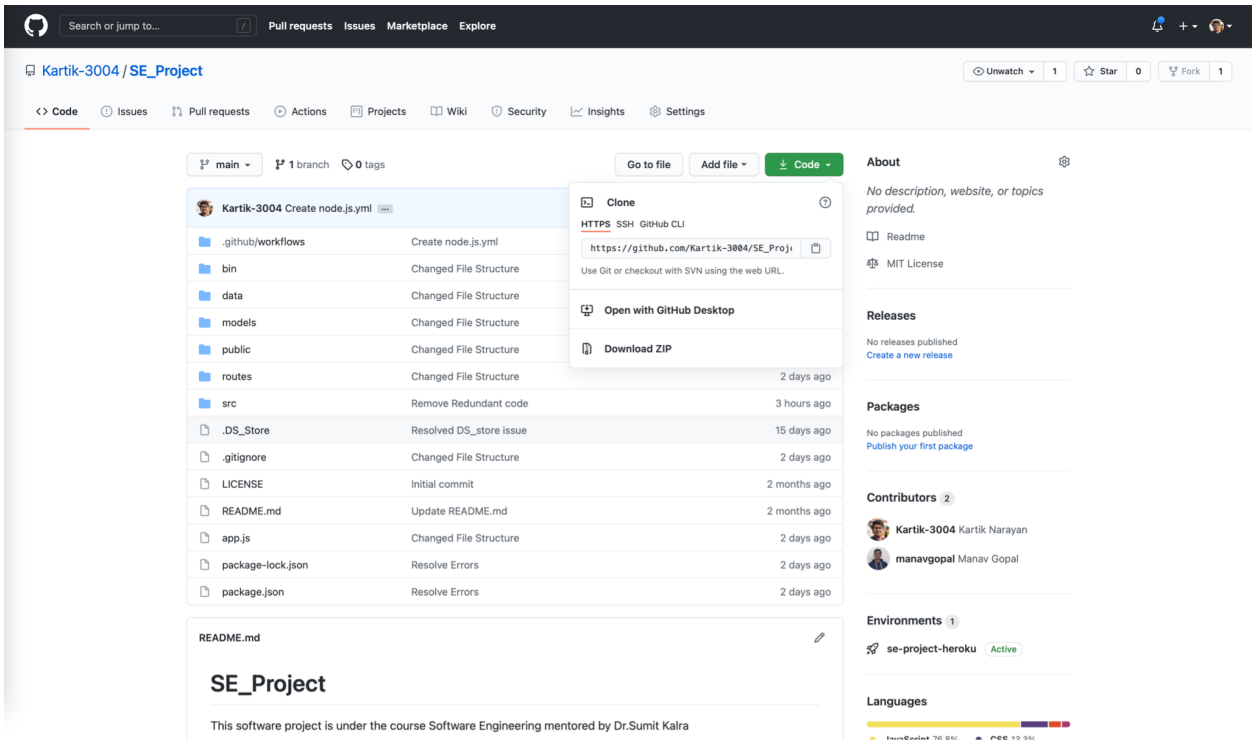
CI-CD pipeline:

- Commit-New coders are integrated to the base code.
- Build-Source code is converted into executable form.
- Test-Check the interaction between builds and if the app is working or not.
- Deploy-Deploys the application to the production environment.

Steps

Step 1-

Clone the project from GitHub which is used to male the CI/CD pipeline.
git clone https://github.com/Kartik-3004/SE_Project.git



Setup the project in your local environment and add your origin repository.
git remote add origin https://github.com/Kartik-3004/SE_Project.git

Step 2 -

Open the project in your local computer in an editor Now create a .yml file.
mkdir .github/
mkdir .github/workflows/
touch .github/workflows/node.js.yml

Step 3 -

Write the code of the pipeline

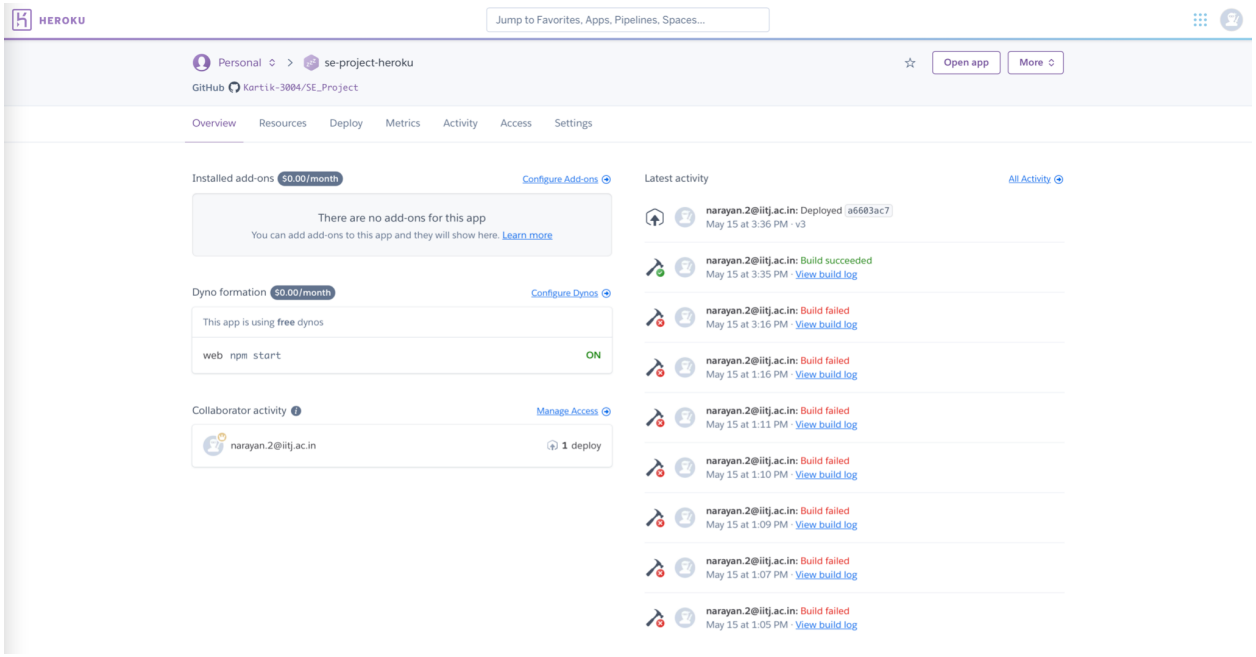
```
# This workflow will do a clean install of node dependencies, build the source code
and run tests across different versions of node
```

```yaml
# For more information see:
https://help.github.com/actions/language-and-framework-guides/using-nodejs-with-github
-actions

name: Node.js CI

on:
 push:
   branches: [ main ]
 pull_request:
   branches: [ main ]

jobs:
 build:

   runs-on: ubuntu-latest

   strategy:
     matrix:
       node-version: [10.x, 12.x, 14.x, 15.x]
       # See supported Node.js release schedule at
https://nodejs.org/en/about/releases/

   steps:
   - uses: actions/checkout@v2
   - name: Use Node.js ${{ matrix.node-version }}
     uses: actions/setup-node@v2
     with:
       node-version: ${{ matrix.node-version }}
   - run: npm ci
   - run: npm run build --if-present
   - run: npm test
```

Step 4 -

Create an app on heroku for deployment

Add environment variables, HEROKU_API_KEY and HEROKU_APP_NAME to the project and set up the CD.
git push heroku master



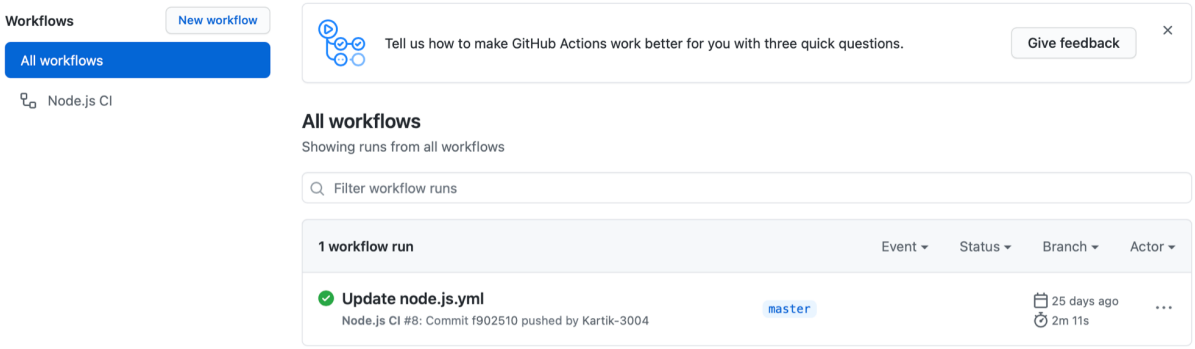
The screenshot shows “build succeed” which shows a CD made is working.

Step 6 -

All the changes are added and committed.
git add .
git commit -m “<name>” git push origin -u master

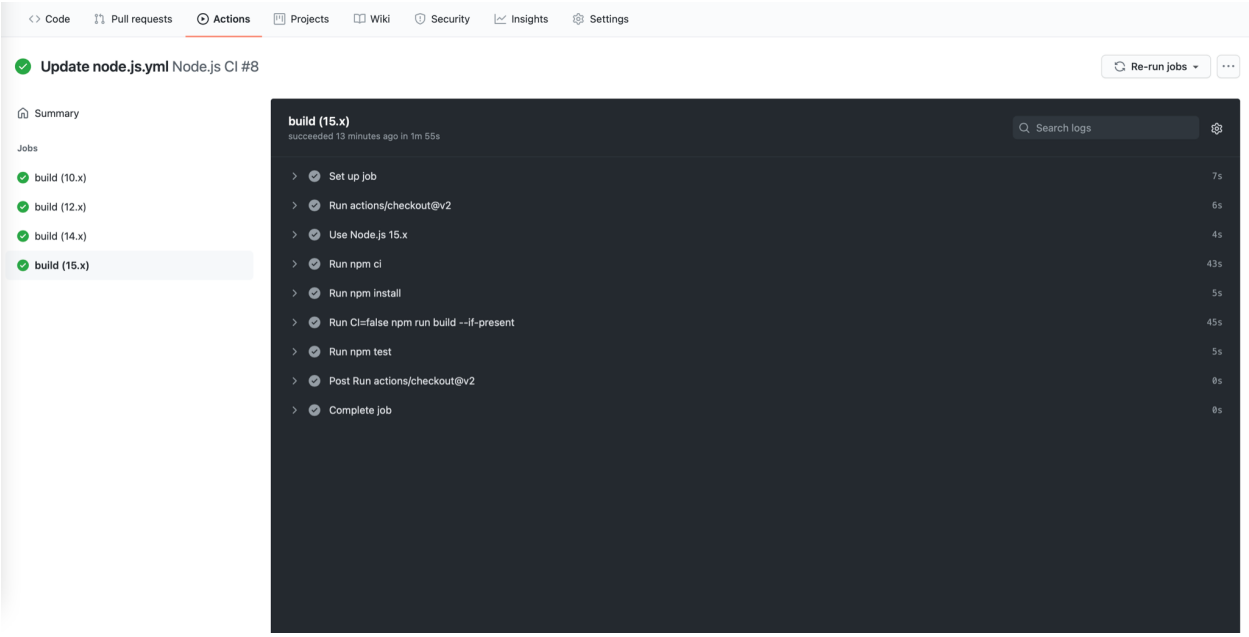
Step 7 -

Github provides features like “Github actions”. Use that to make your CI/CD pipeline. Go to the action sections of the GitHub repository.



Step 8 -

Build pipeline can be seen on clicking the jobs and if there is tic on every stage of the pipeline there we have obtained our pipeline.



TEST CASE DESIGN

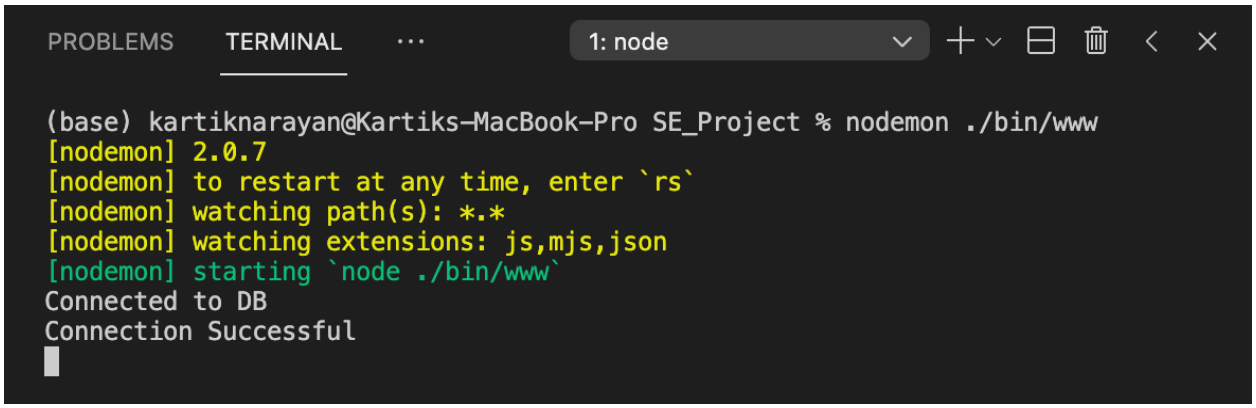
Software Testing is a method to check whether the actual software product matches expected requirements and to ensure that software product is defect free. It involves execution of software/system components using manual or automated tools to evaluate one or more properties of interest. The purpose of software testing is to identify errors, gaps or missing requirements in contrast to actual requirements.
We are testing our software in four different areas. These include backend requests, React frontend, Functional testing, Database connection. We have also integrated the software with CI/CD which tests our software after integration of each functionality. It provides information about any merge conflicts and code errors which disturbs the code base

1. Backend Requests

We have used Node.js along with express.js for our backend. In this testing criteria we are going to test GET and POST requests to the server. We have used Postman to test these which interprets the requests and presents in a very user friendly way. **Postman** is a popular API client that makes it easy for developers to create, share, test and document APIs. This is done by allowing users to create and save simple and complex HTTP/s requests, as well as read their responses.

Steps

Run the backend server and connect it to the database



Write a simple code and make a post request to send some data.

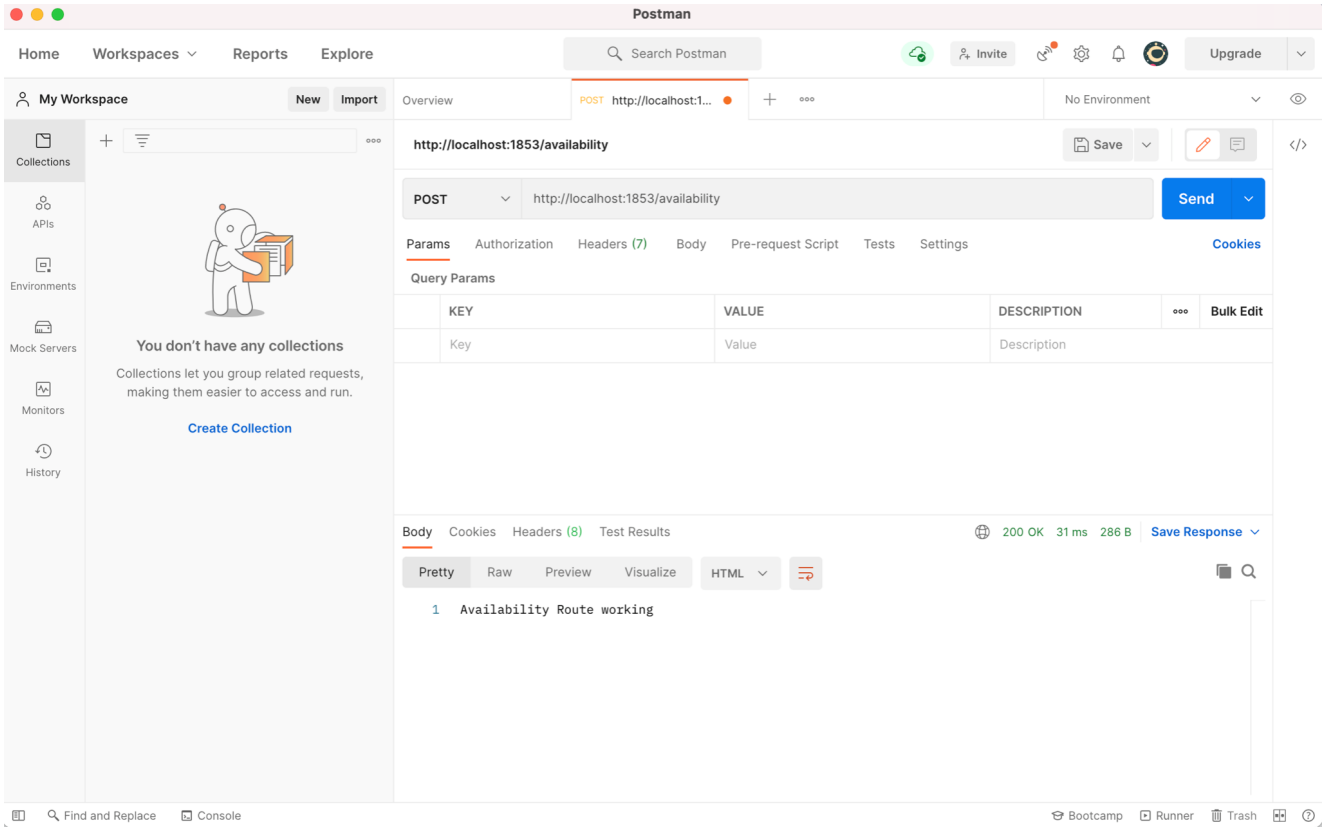
1) Checking availability route

```
const express = require('express');
const router = express.Router();

// Parameters:
// {
//   "date": String ("Apr 30 2021 06:00")
// }

router.post('/', function (req, res, next) {
    res.status(200).send('Availability Route working');
});

module.exports = router;
```

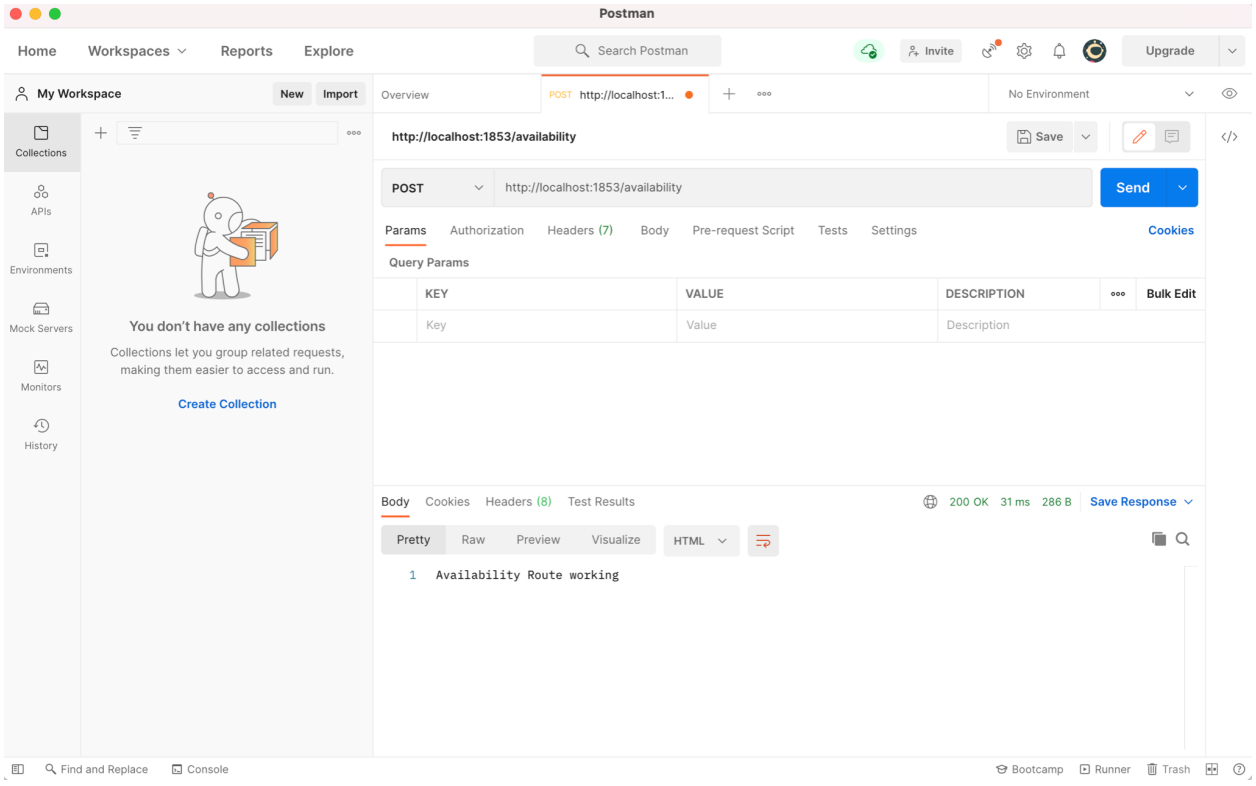
2) Checking reservation route

```
const express = require('express');
const router = express.Router();

// Parameters:
// {
//   "date": String ("Apr 30 2021 06:00")
// }

router.post('/', function (req, res, next) {
    res.status(200).send('Reservation Route working');
});

module.exports = router;
```

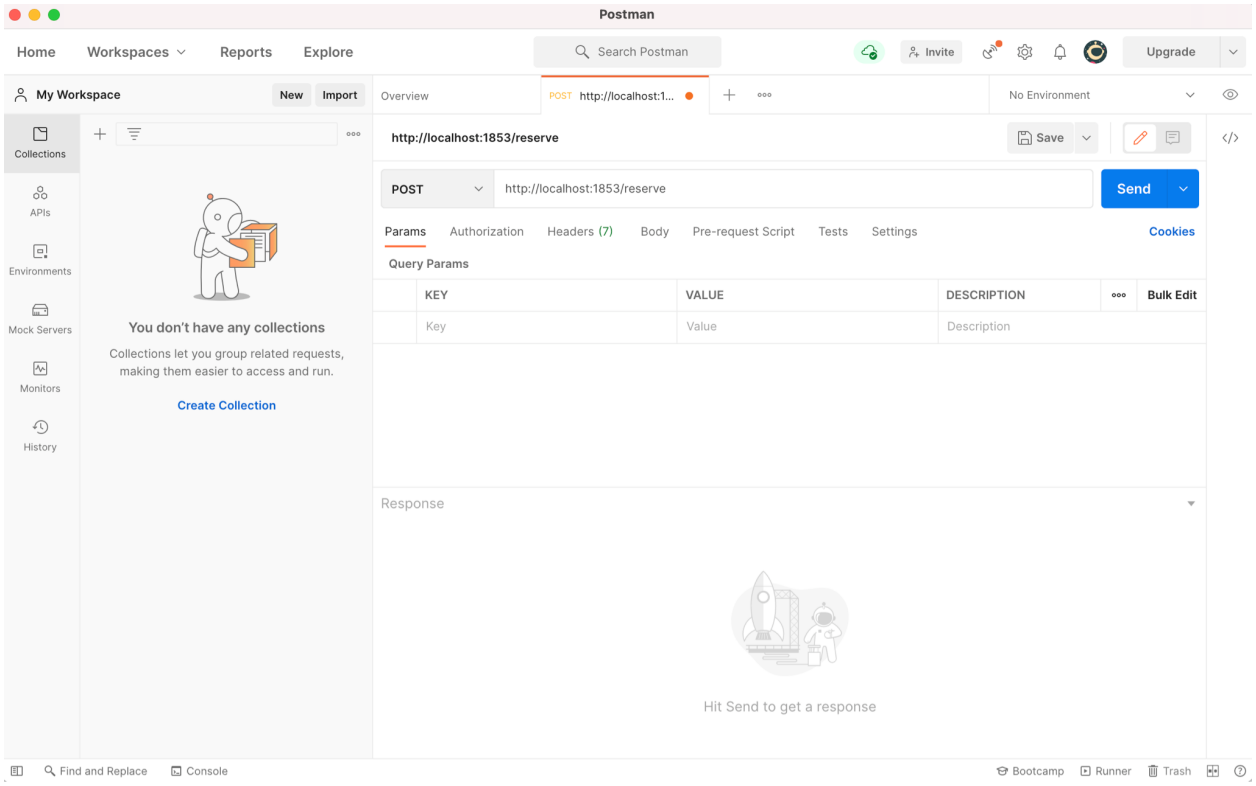
We first need to open the postman application and type the route where the data needs to be altered and set the type of request to POST.
We then use Postman to check whether the get and post request is working or not.



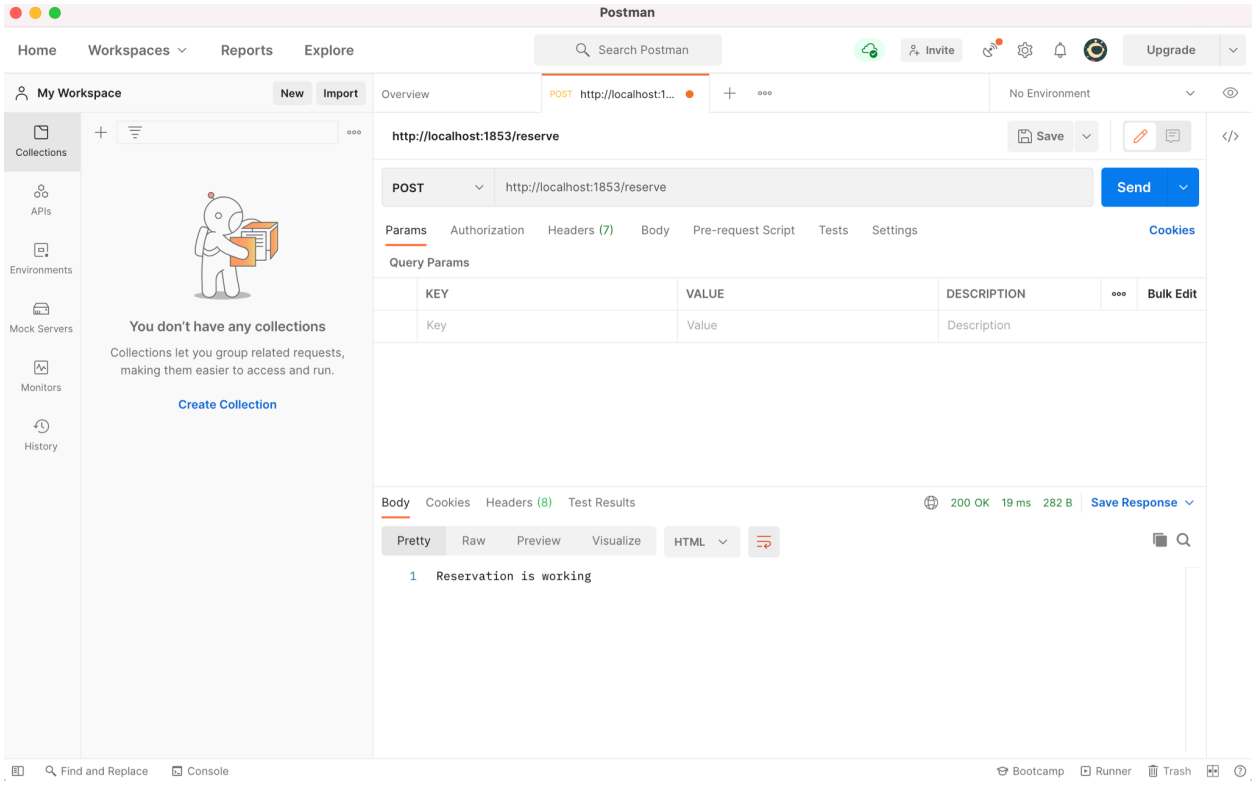
We then send the POST request and check the test results.



The same is to be done for the reservation route.
We fill in the reservation route and select the request type to be POST



We then send the POST request and check the test results.



Conclusion

We can see that the GET and POST requests are working and the server health is fine and there are no bugs. The availability and reservation route both are in use by the server and both are working.

2. React Frontend

We are going to use the inbuilt `"react-scripts test"` provided by React.js to check the frontend of the application. The script will check the react buttons, routing and ensure the correct development practices are used.

```
(base) kartiknarayan@Kartiks-MacBook-Pro SE_Project % npm test
```

Output

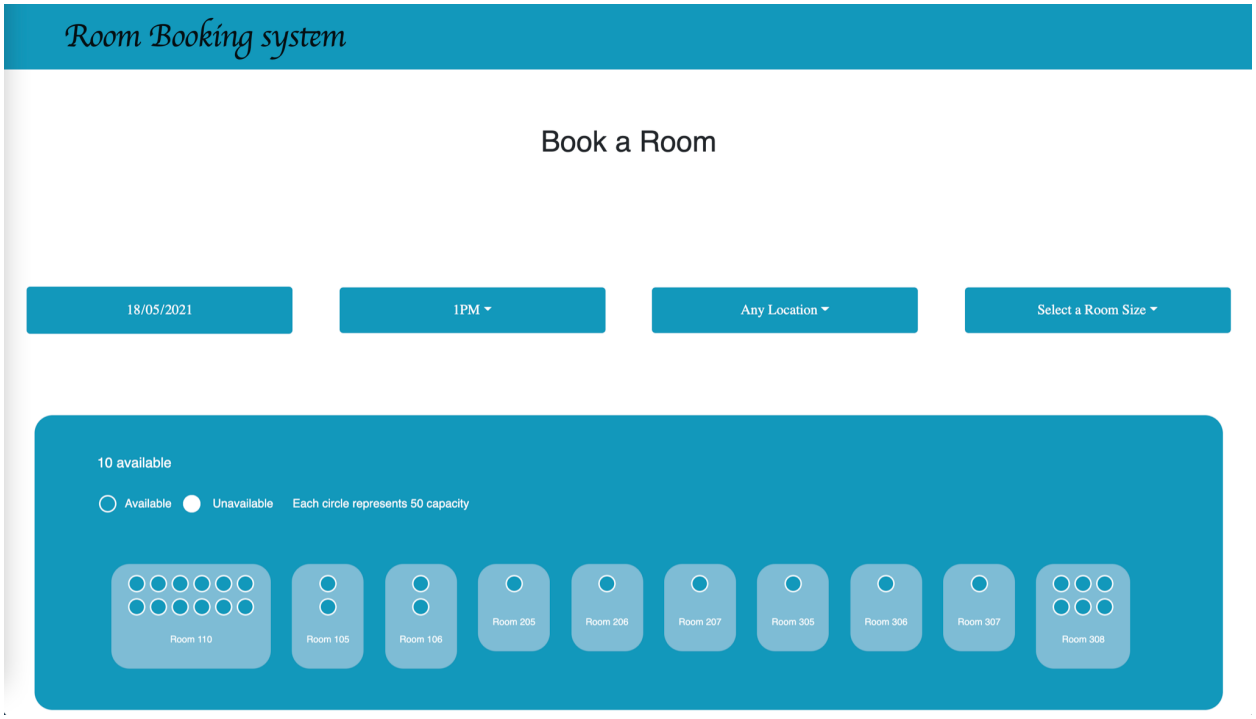
```
 PASS  src/App.test.js
  ✓ renders learn react link (37 ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:   0 total
Time:        1.589 s
Ran all test suites related to changed files.

Watch Usage
 › Press a to run all tests.
 › Press f to run only failed tests.
 › Press q to quit watch mode.
 › Press p to filter by a filename regex pattern.
 › Press t to filter by a test name regex pattern.
 › Press Enter to trigger a test run.
```

Conclusion

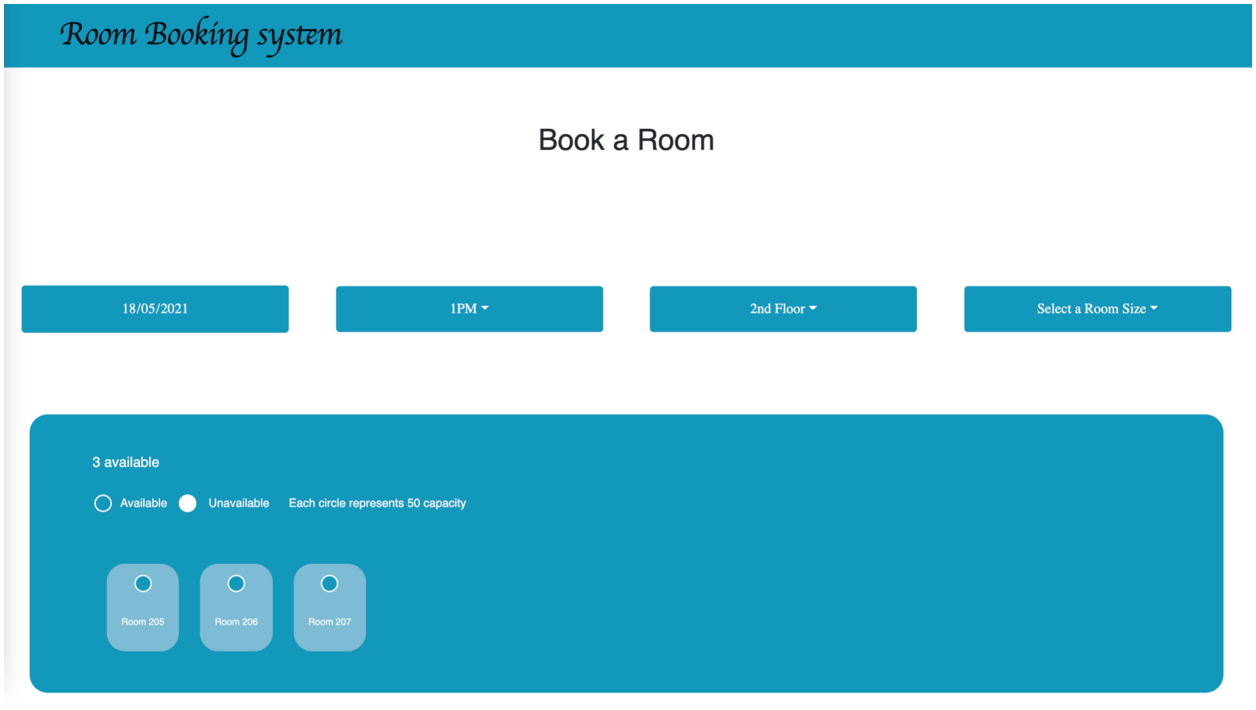
Our application has passed the frontend test using the inbuilt function and there are no eros in the frontend of the application.

3. Functionality Testing

1) Filter of rooms based on location and parameters.



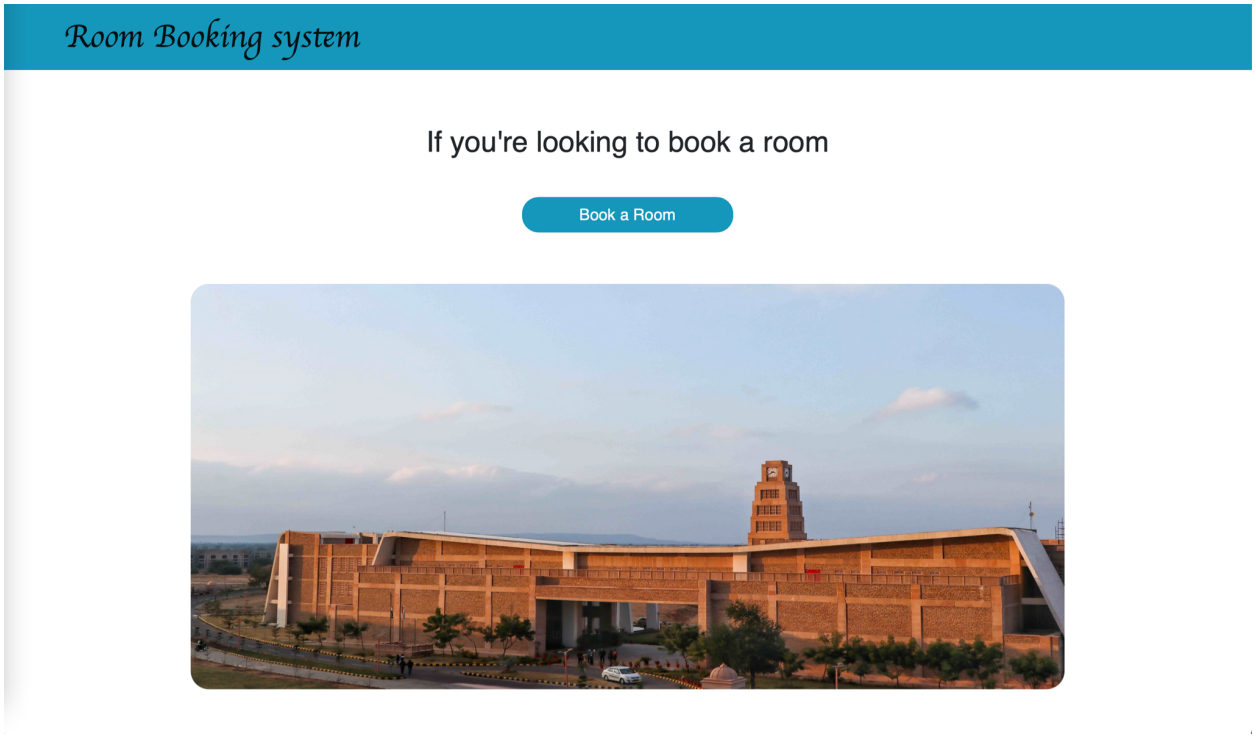
These are the available rooms without any filter applied.



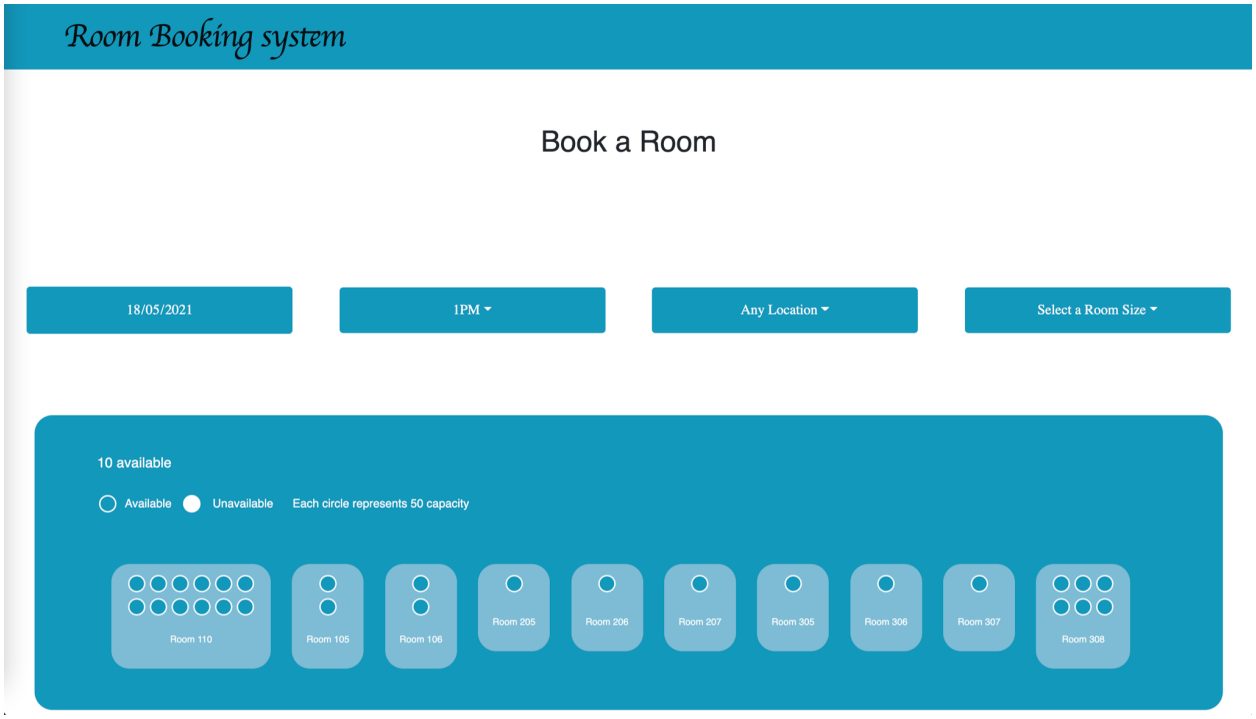
Here we can see the availability of rooms after applying the filter of location where we selected it to be 2nd floor.

2) Same room cannot be booked twice on the same date and time.

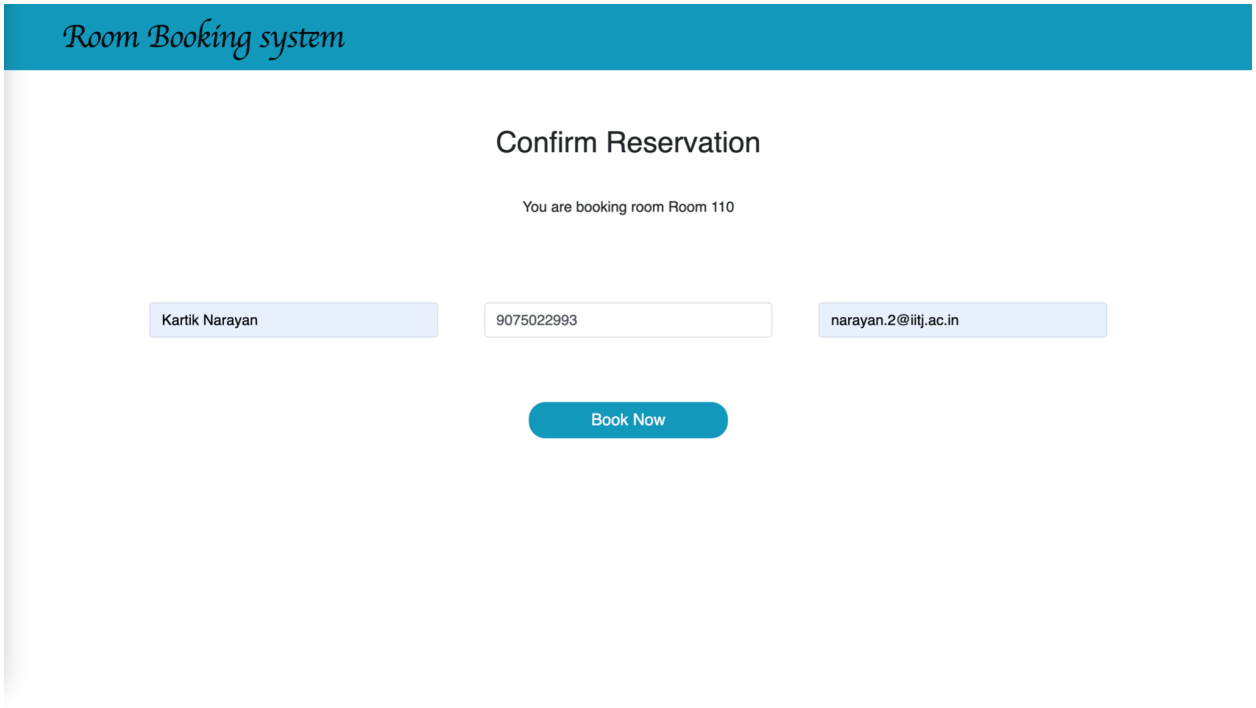
Steps -
Go to the main page of the application and press on book a room



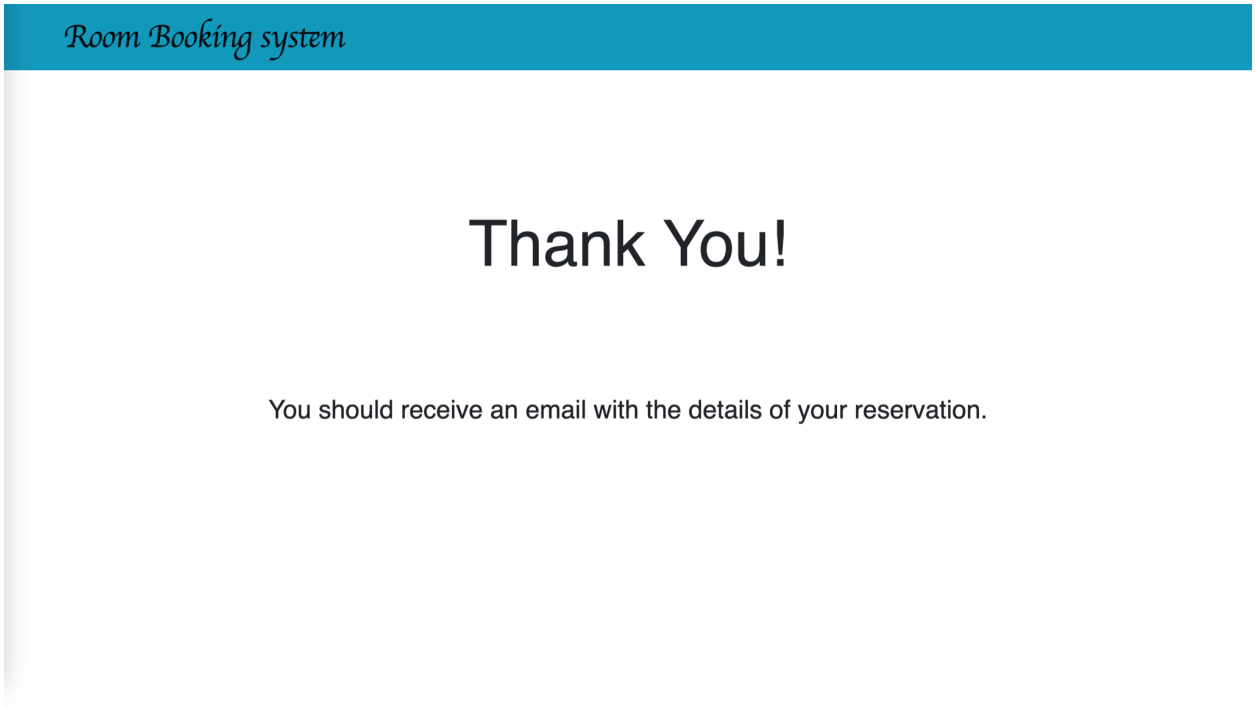
Fill in the details and select the available room.



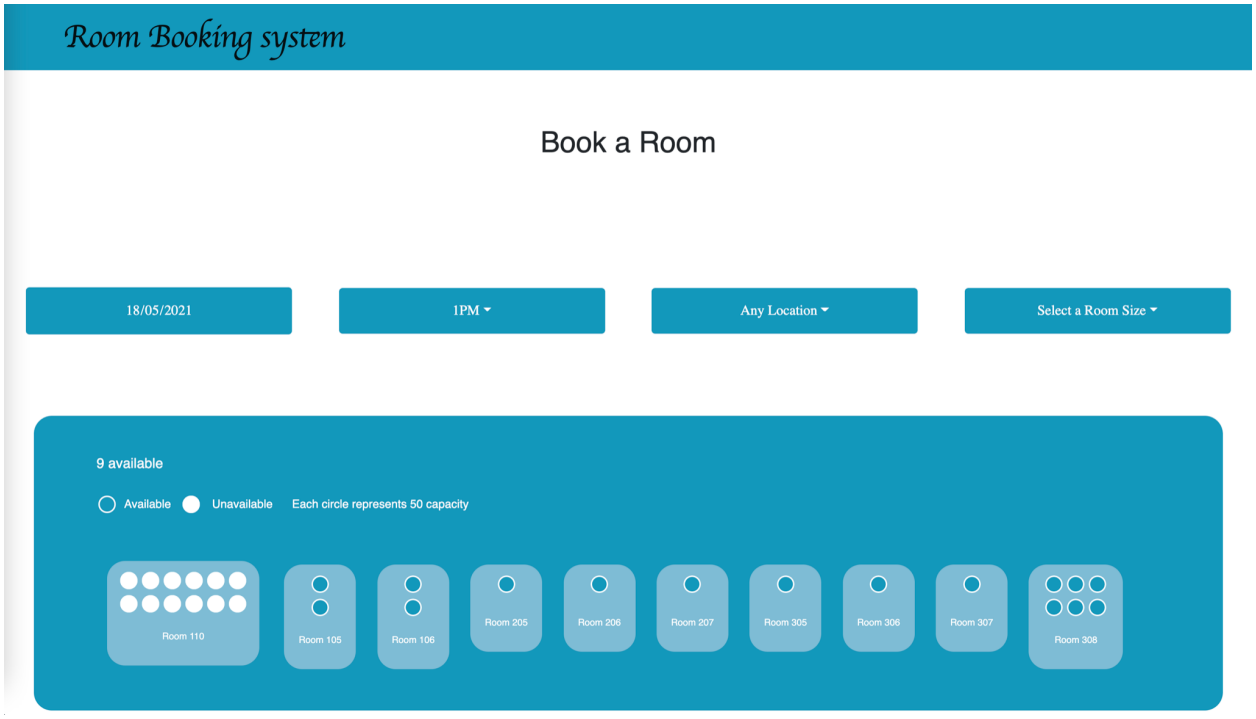
For instance, we can choose Room. 110 and book it for 18/05/2021 at 1PM.
After selecting the room we need to fill in the details



You can then press the book now button and book the room for the filled in date and time.



Now to check whether the application is working we will again open the application and see whether the already booked room is available or it shows unavailable and you cannot book it.



We can see that the already booked room for the same date and time cannot be booked again. The same is shown in the figure above where the unavailable room is displayed by white circles.

Conclusion-

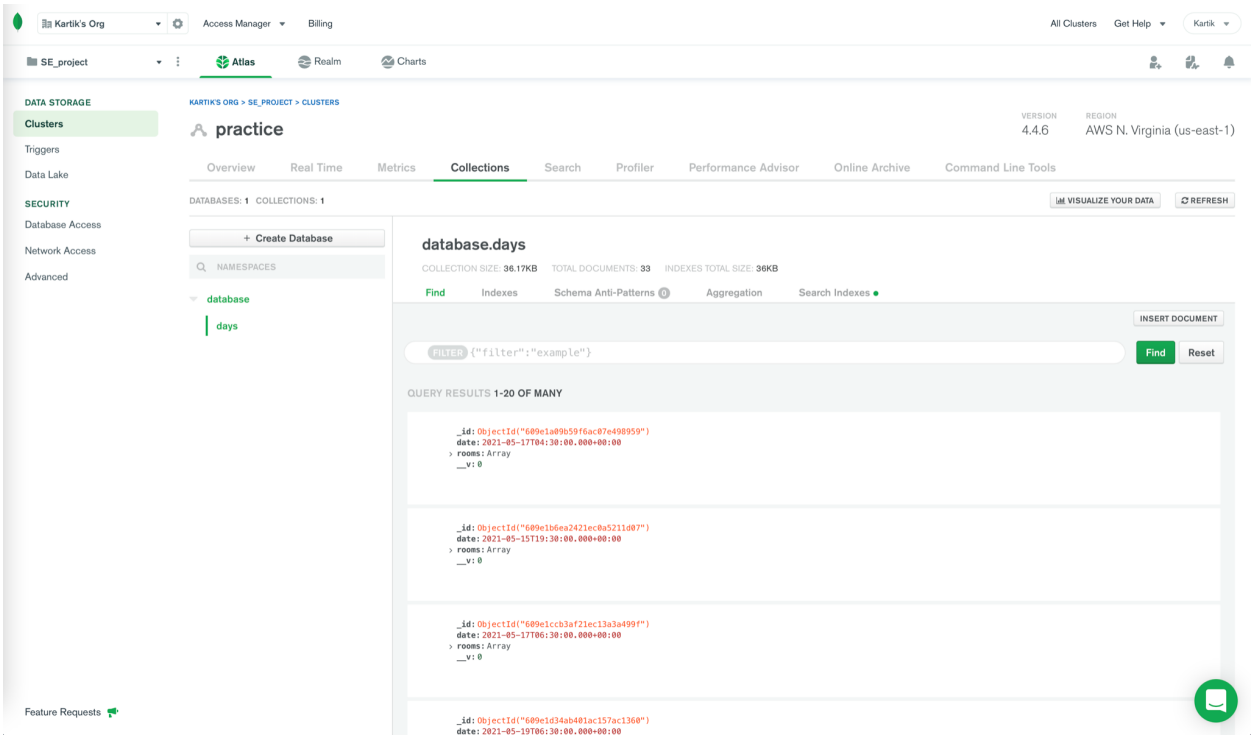
We have tested the room booking functionality of our software and tested some of the features like filtering the room based on parameters like location and capacity. We also checked that the same room cannot be booked twice for the same time

4. Database Testing

In the previous testing scenario where we tested the functionality of the software we filled in some details and booked the room. We will now see whether the data has been uploaded to the database or not.

Steps

Open the database in an interactive UI and go to the required cluster where the data is being stored.



Open the stored data object and check the availability of the rooms.

From the image above we can cross check that the booking status of the Room 110 which we booked has been updated and the availability of the room with the time and date is updated in the database.

Conclusion

The connections to the database are healthy and there are no leaks. The booking details of every booking is updated in the database along with other details of the booking like location and capacity of the room.

Thanking You
Course instructor - DR. Sumit Kalra