Indian Institute of Technology, Gandhinagar

Database for IITGN Maintenance

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WebApp for Database

Databases

CS 432

Under the guidance of

Prof. Mayank Singh

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Responsibility of G1

The front-end of the Web Application is meticulously developed using HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets), supplemented by Jinja2 templating for enhanced and easier formatting, and further bolstered by the inclusion of Bootstrap as a framework.

Frameworks Used

- **HTML**
  HTML, or Hypertext Markup Language, is the fundamental building block of the web, enabling the creation and structuring of web pages. Through a system of tags and elements, HTML allows for the insertion of text, images, links, and other content, forming the backbone of websites and web applications worldwide.

- **CSS**
  CSS, or Cascading Style Sheets, is a stylesheet language used to style the appearance of web content. It allows for the customization of colors, fonts, layouts, and more, enabling developers and designers to create visually appealing and consistent user interfaces across different web pages, enhancing the user experience on the internet.

- **Bootstrap**
  Bootstrap is a powerful, open-source front-end framework designed for responsive, mobile-first web development. It provides a vast array of pre-designed components, utilities, and plugins, making it easier to create aesthetically pleasing, consistent, and functional web pages and applications. Bootstrap facilitates rapid development by offering customizable templates for typography, forms, buttons, navigation, and other interface components, ensuring seamless adaptation to different screen sizes and devices. It has been implemented for designing our website to be more accessible and user-friendly.

- **Jinja2**
  Jinja2 allows developers to write simpler, more readable code by inheriting HTML file structures, enabling the insertion of Python-like expressions directly into HTML files. Jinja2 is widely used for web development because it automates the generation of web pages from templates, making it easier to manage dynamic content.

Login Page

A login page is implemented for quick and secure access to the database.

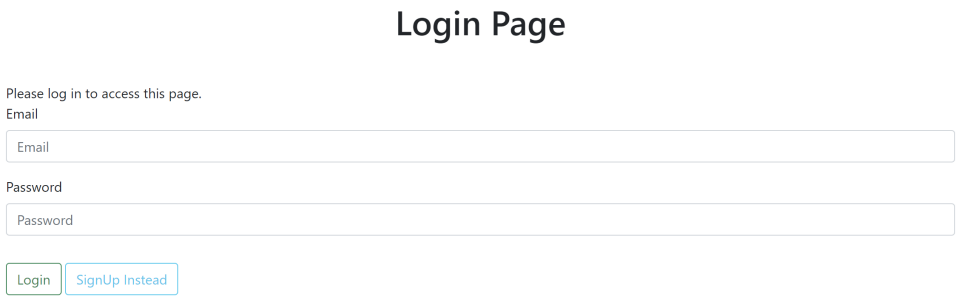


Figure 1: Login Page

SignUp Page

A SignUp page is implemented for the new users to sign-up before they can access the WebApp.

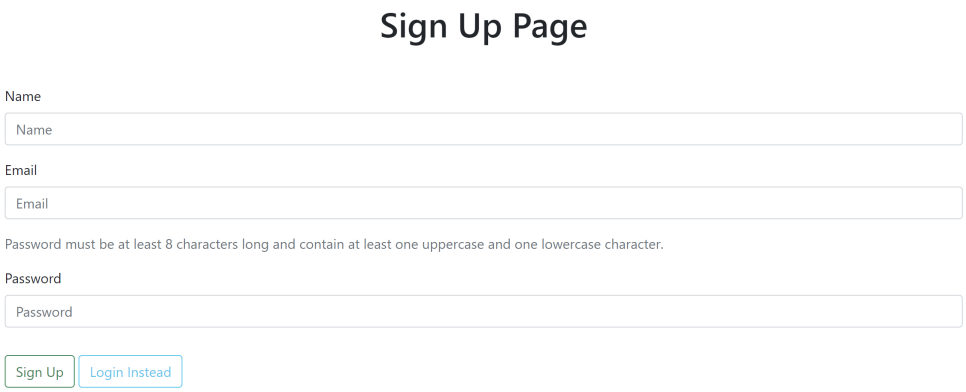


Figure 2: Singup Page

Home Page

The preceding section showcases the website's homepage, serving as the central hub where users can undertake various actions.

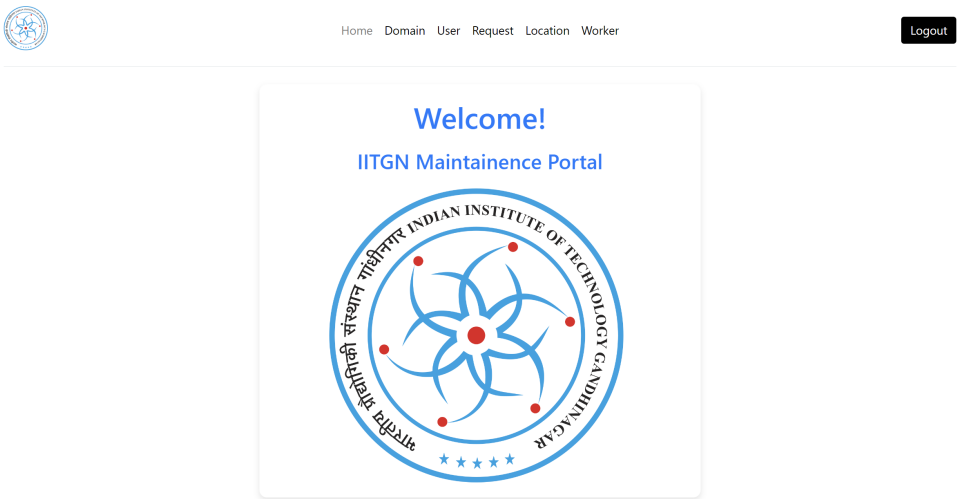
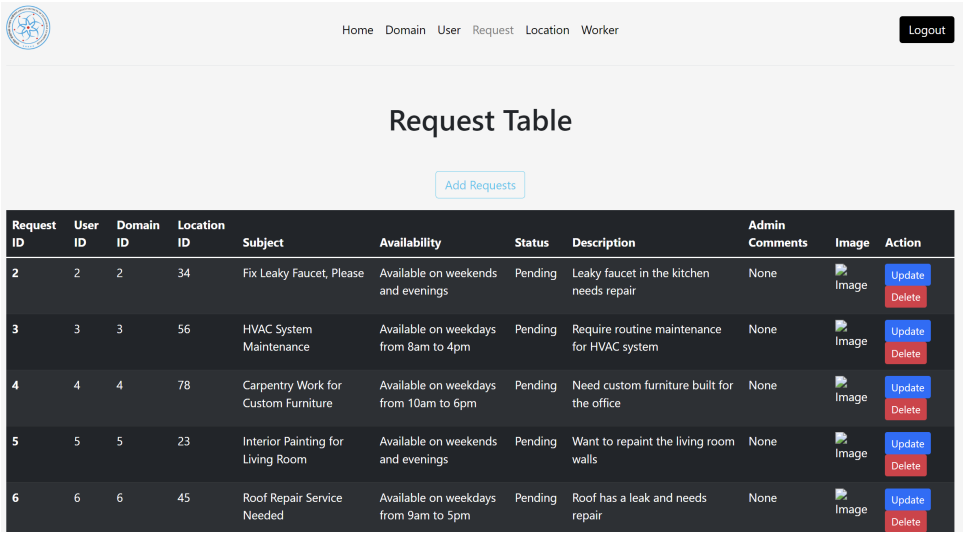


Figure 3: Home Page

Request Page

This page displays the current added requests as well as provides an option for registering another request.

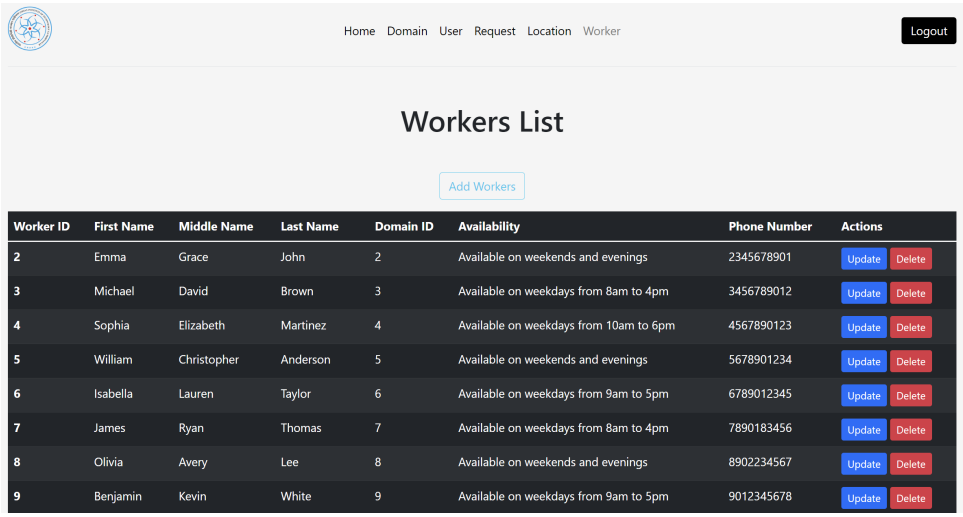


Request ID	User ID	Domain ID	Location ID	Subject	Availability	Status	Description	Admin Comments	Image	Action
2	2	2	34	Fix Leaky Faucet, Please	Available on weekends and evenings	Pending	Leaky faucet in the kitchen needs repair	None	Image	Update Delete
3	3	3	56	HVAC System Maintenance	Available on weekdays from 8am to 4pm	Pending	Require routine maintenance for HVAC system	None	Image	Update Delete
4	4	4	78	Carpentry Work for Custom Furniture	Available on weekdays from 10am to 6pm	Pending	Need custom furniture built for the office	None	Image	Update Delete
5	5	5	23	Interior Painting for Living Room	Available on weekends and evenings	Pending	Want to repaint the living room walls	None	Image	Update Delete
6	6	6	45	Roof Repair Service Needed	Available on weekdays from 9am to 5pm	Pending	Roof has a leak and needs repair	None	Image	Update Delete

Figure 4: Request Page

Workers Page

This page displays the currently registered workers alongside the option to register another worker.

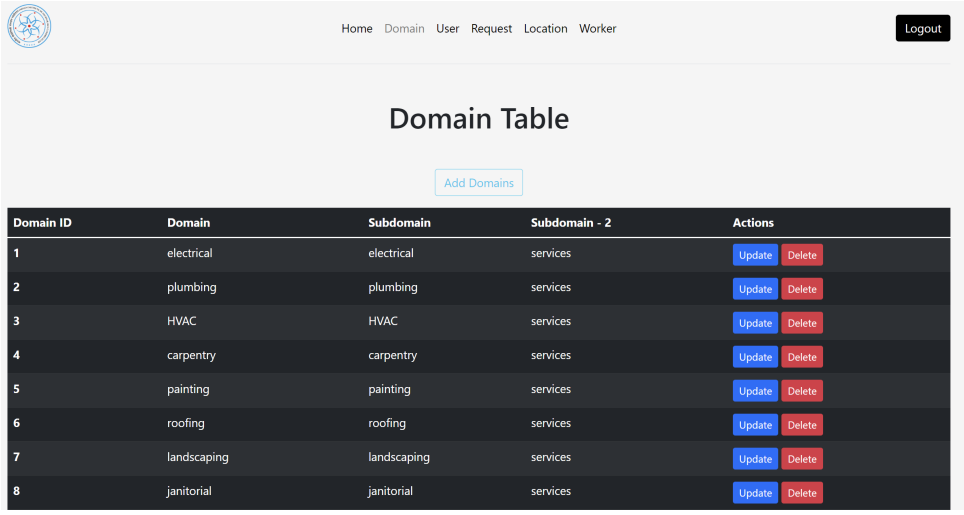


Worker ID	First Name	Middle Name	Last Name	Domain ID	Availability	Phone Number	Actions
2	Emma	Grace	John	2	Available on weekends and evenings	2345678901	Update Delete
3	Michael	David	Brown	3	Available on weekdays from 8am to 4pm	3456789012	Update Delete
4	Sophia	Elizabeth	Martinez	4	Available on weekdays from 10am to 6pm	4567890123	Update Delete
5	William	Christopher	Anderson	5	Available on weekends and evenings	5678901234	Update Delete
6	Isabella	Lauren	Taylor	6	Available on weekdays from 9am to 5pm	6789012345	Update Delete
7	James	Ryan	Thomas	7	Available on weekdays from 8am to 4pm	7890183456	Update Delete
8	Olivia	Avery	Lee	8	Available on weekends and evenings	8902234567	Update Delete
9	Benjamin	Kevin	White	9	Available on weekdays from 9am to 5pm	9012345678	Update Delete

Figure 5: Workers Page

Domain Page

This page mentions all the domains and allows to enter another domain if needed.

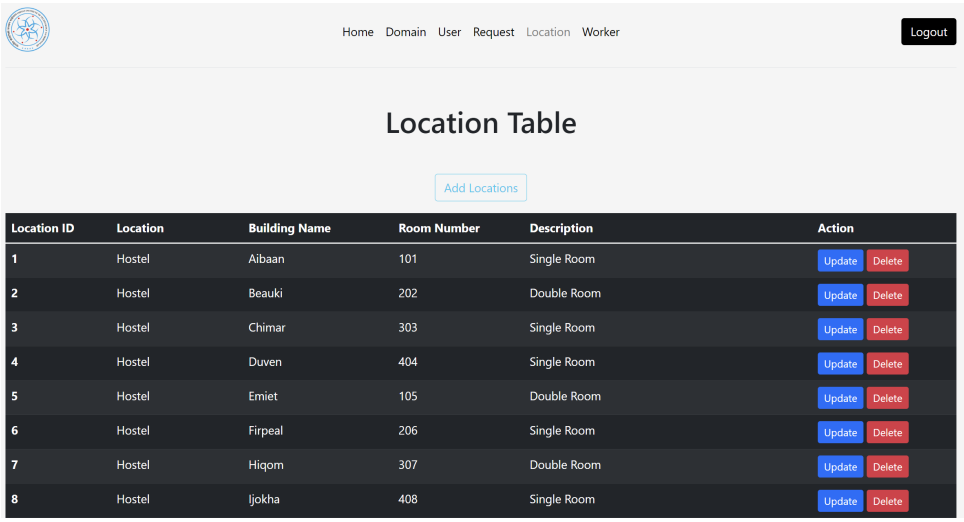


Domain ID	Domain	Subdomain	Subdomain - 2	Actions
1	electrical	electrical	services	Update Delete
2	plumbing	plumbing	services	Update Delete
3	HVAC	HVAC	services	Update Delete
4	carpentry	carpentry	services	Update Delete
5	painting	painting	services	Update Delete
6	roofing	roofing	services	Update Delete
7	landscaping	landscaping	services	Update Delete
8	janitorial	janitorial	services	Update Delete

Figure 6: Domain Page

Location Page

This page mentions all the currently registered locations and provides option to enter more.



Location ID	Location	Building Name	Room Number	Description	Action
1	Hostel	Aibaan	101	Single Room	Update Delete
2	Hostel	Beauki	202	Double Room	Update Delete
3	Hostel	Chimar	303	Single Room	Update Delete
4	Hostel	Duven	404	Single Room	Update Delete
5	Hostel	Emiet	105	Double Room	Update Delete
6	Hostel	Firpeal	206	Single Room	Update Delete
7	Hostel	Hiqom	307	Double Room	Update Delete
8	Hostel	Ijokha	408	Single Room	Update Delete

Figure 7: Location Page

User Page

This page mentions all the registered users and option to add more.

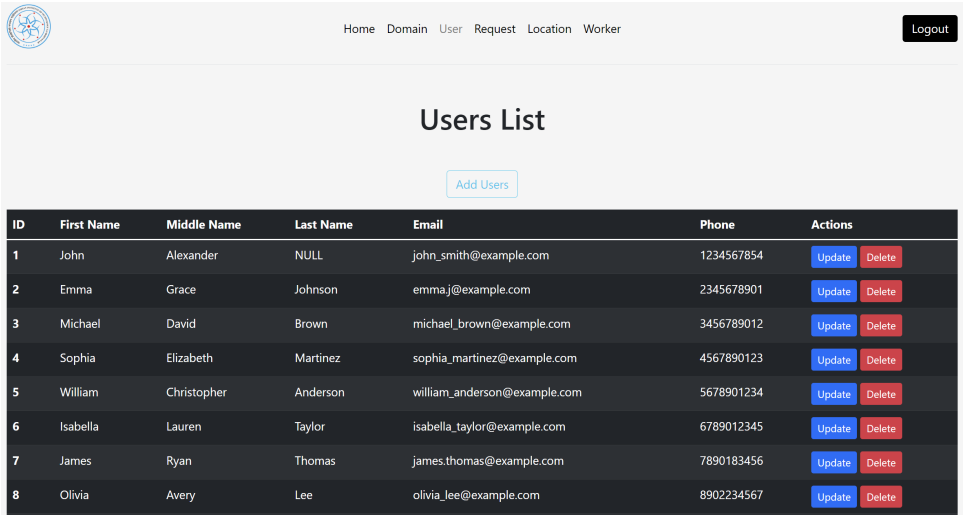


Figure 8: User Page

Responsibility of G2

In developing the backend for our web application, we undertook the responsibility of architecting a robust system that manages various aspects crucial for its functionality. Leveraging the Flask framework alongside MySQL for database management, we orchestrated a backend solution capable of handling user authentication, domain and location management, request handling, as well as user and worker administration. By implementing a structured approach to backend development, we aimed to ensure seamless communication between the frontend and database while maintaining the integrity and security of user data. Through the use of Flask's modular design and extensive ecosystem of extensions, our backend system emerged as a versatile and scalable foundation for the web application.

Backend Artitechture

The backend architecture follows a model-view-controller (MVC) pattern, where Flask serves as the controller handling incoming requests, querying the database, and rendering appropriate views. The model layer consists of SQLAlchemy ORM models representing database tables, facilitating object-oriented interactions with the database. Views are rendered using Jinja2 templates, allowing dynamic content generation based on data retrieved from the backend. Overall, this architecture ensures the separation of concerns, scalability, and maintainability of the backend system.

Libraries Used

- **Flask**: Flask serves as the core framework for our web application, providing the foundational structure for request handling, routing, and view rendering.
- **Flask-Login**: Flask-Login is utilized for user session management, enabling authentication and authorization features.
- **Flask-MySQLdb**: This extension bridges Flask with MySQL, enabling seamless communication between the Flask application and the MySQL database.
- **Flask-SQLAlchemy**: Flask-SQLAlchemy integrates SQLAlchemy, an ORM tool, with Flask, simplifying database interactions by abstracting away SQL queries into Python objects.
- **mysqlclient**: mysqlclient is a MySQL database connector for Python, which Flask-MySQLdb utilizes internally.
- **SQLAlchemy**: SQLAlchemy is an SQL toolkit and ORM for Python, used by Flask-SQLAlchemy to interact with databases.
- **Werkzeug**: Werkzeug is a WSGI utility library for Python, providing low-level interfaces for HTTP request handling and response generation.

API Endpoints Overview

Table 1: API Endpoints and Descriptions

API Endpoint	Method	Description
/auth/login	GET	Renders login page.
/auth/login	POST	Authenticates user.
/auth/signup	GET	Renders signup page.
/auth/signup	POST	Registers new user.
/auth/logout	GET	Logs out user.
/domains	GET	Retrieves all domains.
/domains/add	POST	Adds a new domain.
/domains/update/<id>	POST	Updates an existing domain.
/domains/delete/<id>	POST	Deletes an existing domain.
/locations	GET	Retrieves all locations.
/locations/add	POST	Adds a new location.
/locations/update/<id>	POST	Updates an existing location.
/locations/delete/<id>	POST	Deletes an existing location.
/requests	GET	Retrieves all requests.
/requests/add	POST	Adds a new request.
/requests/update/<id>	POST	Updates an existing request.
/requests/delete/<id>	POST	Deletes an existing request.
/users	GET	Retrieves all users.
/users/add	POST	Adds a new user.
/users/update/<id>	POST	Updates an existing user.
/users/delete/<id>	POST	Deletes an existing user.
/workers	GET	Retrieves all workers.
/workers/add	POST	Adds a new worker.
/workers/update/<id>	POST	Updates an existing worker.
/workers/delete/<id>	POST	Deletes an existing worker.

Challenges with Implementing RENAME Operation

The RENAME operation, which allows renaming the name of a table or column, presents challenges in the context of our backend implementation. While the operation itself seems straightforward, its implementation introduces complexities due to dependencies on table and column names in other operations.

In our backend architecture, various operations such as querying, updating, and deleting data rely on specific table and column names. If these names are altered using the RENAME operation, it can potentially break the functionality of other operations that reference them. For instance, if a table or column name used in a query is renamed, the query would no longer retrieve the expected data, leading to errors or unintended behavior.

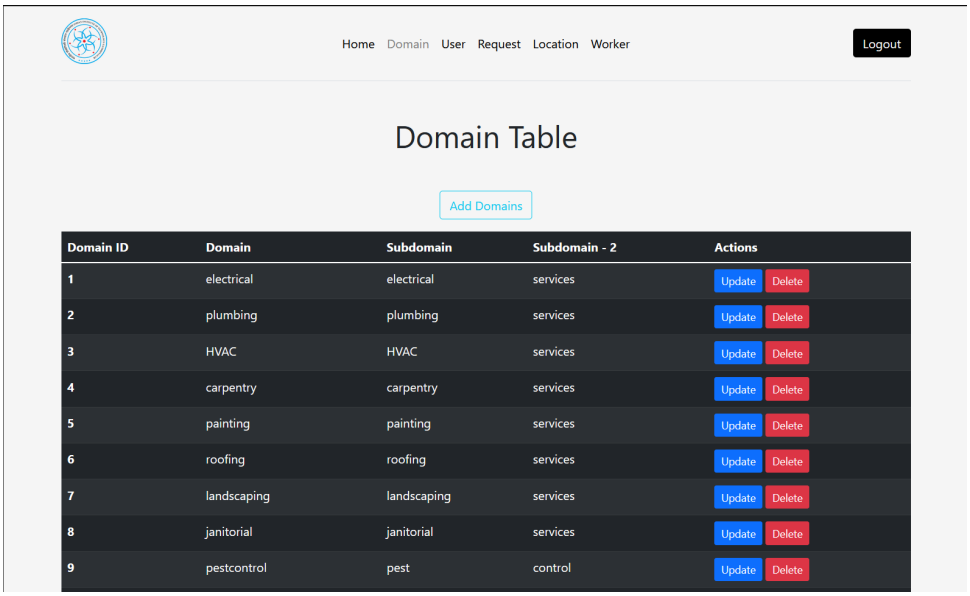
Moreover, ensuring consistency across the entire application becomes difficult when table or column names are subject to change. Developers would need to meticulously update all references to the renamed entities throughout the codebase, which is error-prone and time-consuming.

After discussing the matter with a Teaching Assistant (TA), it was concluded that integrating the RENAME operation into our backend system would require significant restructuring and validation to mitigate the risks associated with potential data inconsistencies and operational failures. Given the project constraints and prioritization of core functionalities, the decision was made to defer the implementation of the RENAME operation for future iterations, focusing instead on delivering a stable and reliable system that meets essential requirements.

Responsibility of G1 and G2

Display of Dummy Entries

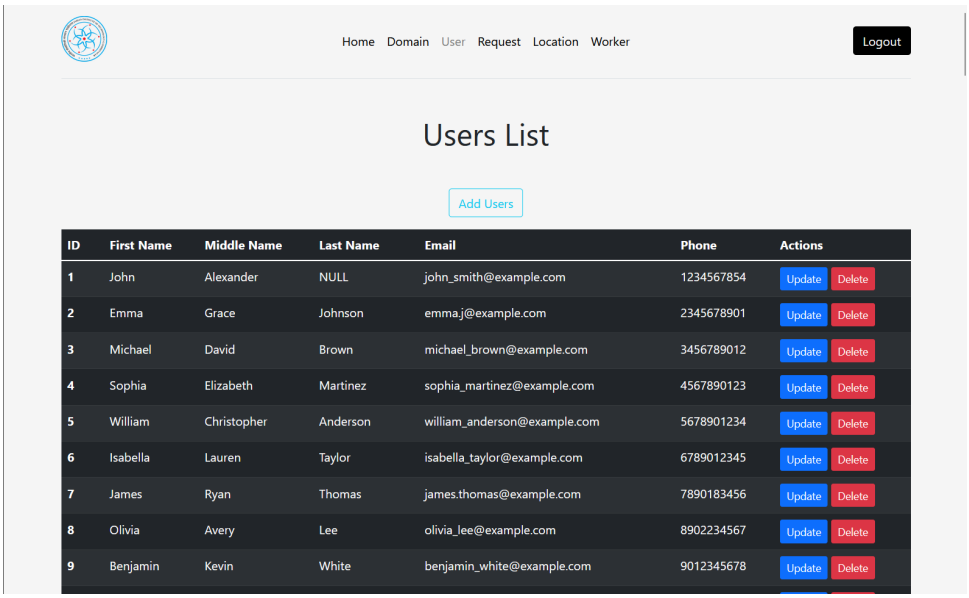
Domain Table



Domain ID	Domain	Subdomain	Subdomain - 2	Actions
1	electrical	electrical	services	Update Delete
2	plumbing	plumbing	services	Update Delete
3	HVAC	HVAC	services	Update Delete
4	carpentry	carpentry	services	Update Delete
5	painting	painting	services	Update Delete
6	roofing	roofing	services	Update Delete
7	landscaping	landscaping	services	Update Delete
8	janitorial	janitorial	services	Update Delete
9	pestcontrol	pest	control	Update Delete

Figure 9: Domain Page dummy values

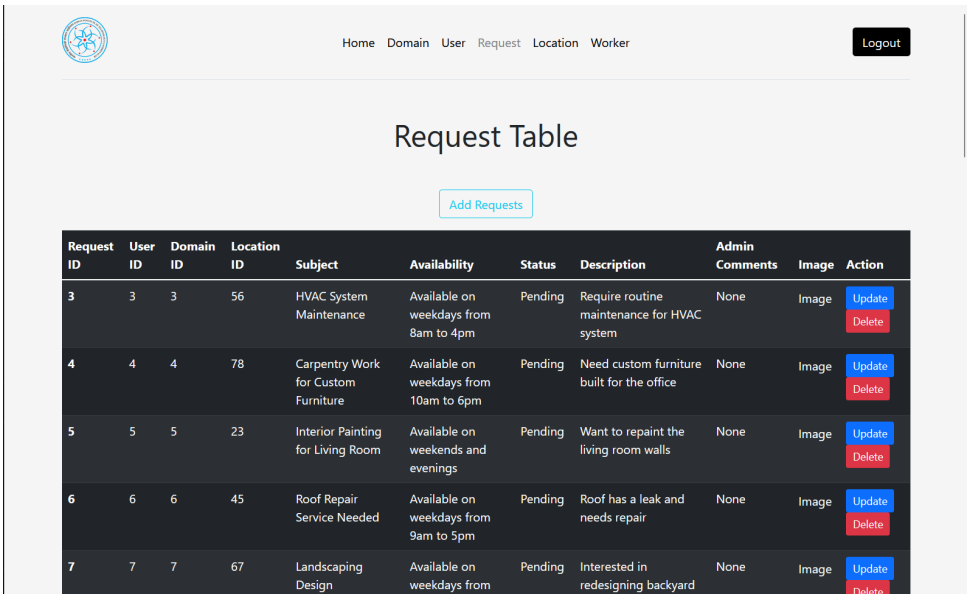
User Table



ID	First Name	Middle Name	Last Name	Email	Phone	Actions
1	John	Alexander	NULL	john_smith@example.com	1234567854	Update Delete
2	Emma	Grace	Johnson	emma.j@example.com	2345678901	Update Delete
3	Michael	David	Brown	michael_brown@example.com	3456789012	Update Delete
4	Sophia	Elizabeth	Martinez	sophia_martinez@example.com	4567890123	Update Delete
5	William	Christopher	Anderson	william_anderson@example.com	5678901234	Update Delete
6	Isabella	Lauren	Taylor	isabella_taylor@example.com	6789012345	Update Delete
7	James	Ryan	Thomas	james.thomas@example.com	7890183456	Update Delete
8	Olivia	Avery	Lee	olivia_lee@example.com	8902234567	Update Delete
9	Benjamin	Kevin	White	benjamin_white@example.com	9012345678	Update Delete

Figure 10: User Page dummy values

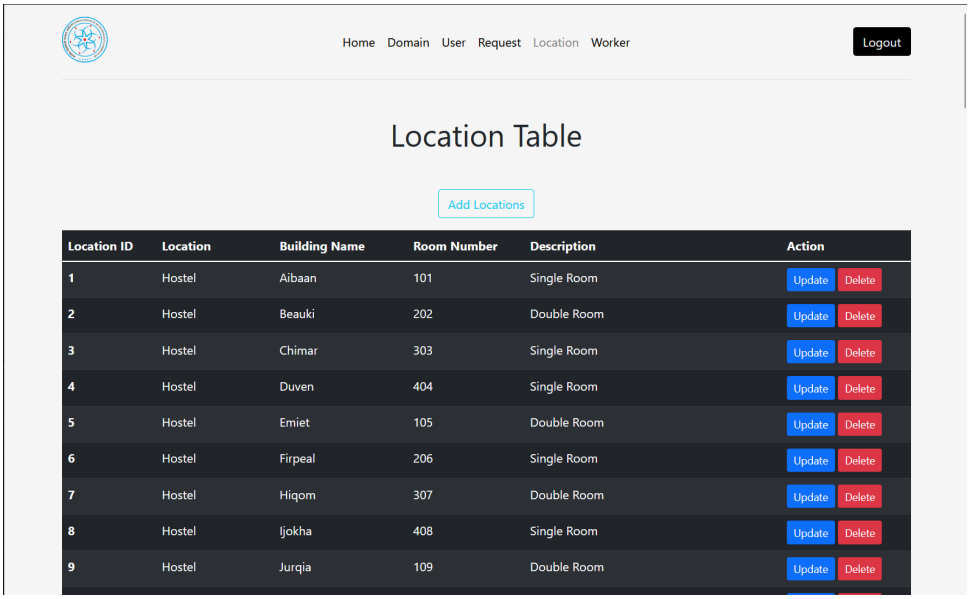
Request Table



Request ID	User ID	Domain ID	Location ID	Subject	Availability	Status	Description	Admin Comments	Image	Action
3	3	3	56	HVAC System Maintenance	Available on weekdays from 8am to 4pm	Pending	Require routine maintenance for HVAC system	None	Image	Update Delete
4	4	4	78	Carpentry Work for Custom Furniture	Available on weekdays from 10am to 6pm	Pending	Need custom furniture built for the office	None	Image	Update Delete
5	5	5	23	Interior Painting for Living Room	Available on weekends and evenings	Pending	Want to repaint the living room walls	None	Image	Update Delete
6	6	6	45	Roof Repair Service Needed	Available on weekdays from 9am to 5pm	Pending	Roof has a leak and needs repair	None	Image	Update Delete
7	7	7	67	Landscaping Design	Available on weekdays from	Pending	Interested in redesigning backyard	None	Image	Update Delete

Figure 11: Request Page dummy values

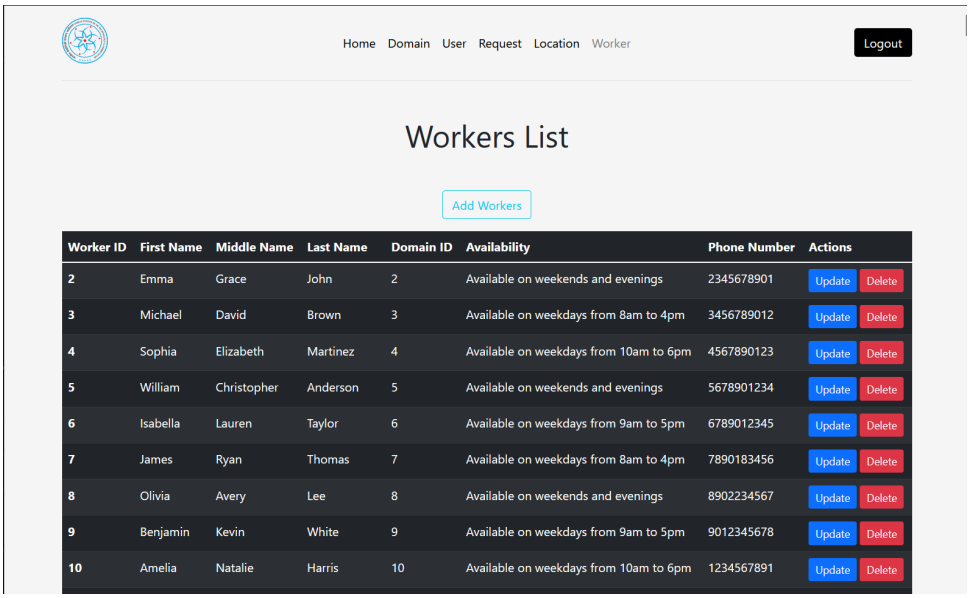
Location Table



Location ID	Location	Building Name	Room Number	Description	Action
1	Hostel	Aibaan	101	Single Room	Update Delete
2	Hostel	Beauki	202	Double Room	Update Delete
3	Hostel	Chimar	303	Single Room	Update Delete
4	Hostel	Duven	404	Single Room	Update Delete
5	Hostel	Emiet	105	Double Room	Update Delete
6	Hostel	Firpeal	206	Single Room	Update Delete
7	Hostel	Hiqom	307	Double Room	Update Delete
8	Hostel	Ijokha	408	Single Room	Update Delete
9	Hostel	Jurqia	109	Double Room	Update Delete

Figure 12: Location Page dummy values

Worker Table



Worker ID	First Name	Middle Name	Last Name	Domain ID	Availability	Phone Number	Actions
2	Emma	Grace	John	2	Available on weekends and evenings	2345678901	Update Delete
3	Michael	David	Brown	3	Available on weekdays from 8am to 4pm	3456789012	Update Delete
4	Sophia	Elizabeth	Martinez	4	Available on weekdays from 10am to 6pm	4567890123	Update Delete
5	William	Christopher	Anderson	5	Available on weekends and evenings	5678901234	Update Delete
6	Isabella	Lauren	Taylor	6	Available on weekdays from 9am to 5pm	6789012345	Update Delete
7	James	Ryan	Thomas	7	Available on weekdays from 8am to 4pm	7890183456	Update Delete
8	Olivia	Avery	Lee	8	Available on weekends and evenings	8902234567	Update Delete
9	Benjamin	Kevin	White	9	Available on weekdays from 9am to 5pm	9012345678	Update Delete
10	Amelia	Natalie	Harris	10	Available on weekdays from 10am to 6pm	1234567891	Update Delete

Figure 13: Worker Page dummy values

Operations in User List

INSERT operation

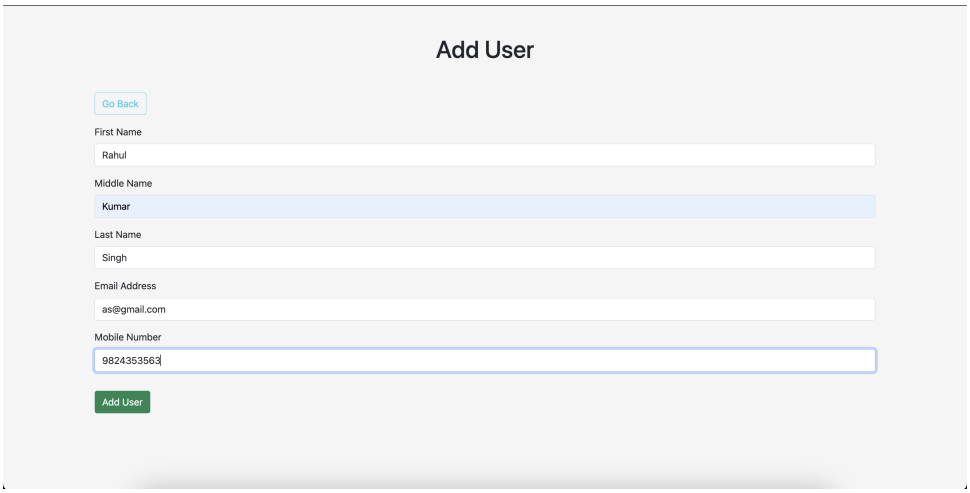


Figure 14: Insert Operation on User Table

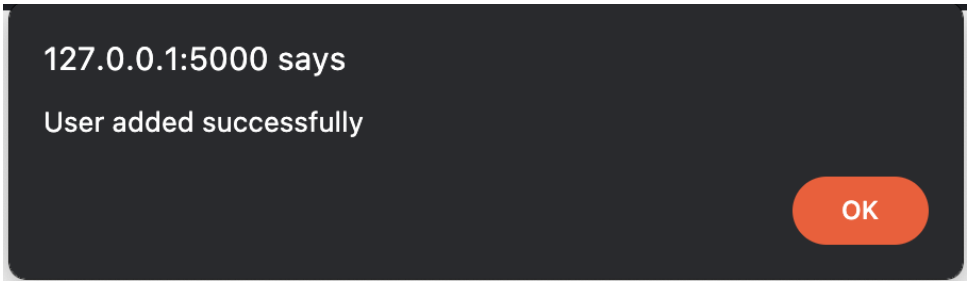
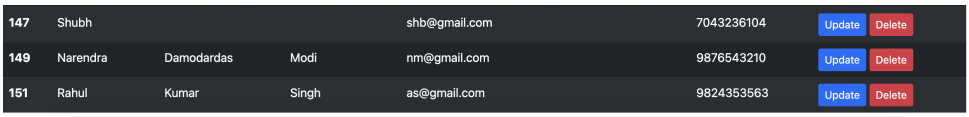


Figure 15: Added Successfully Dialog Box



147	Shubh			shb@gmail.com	7043236104	Update Delete
149	Narendra	Damodardas	Modi	nm@gmail.com	9876543210	Update Delete
151	Rahul	Kumar	Singh	as@gmail.com	9824353563	Update Delete

Figure 16: Changes reflected on WebApp

147	Shubh			shb@gmail.com	7043236104	
149	Narendra	Damodardas	Modi	nm@gmail.com	9876543210	
151	Rahul	Kumar	Singh	as@gmail.com	9824353563	
NULL	NULL	NULL	NULL	NULL	NULL	

Figure 17: Changes reflected in Database

DELETE operations

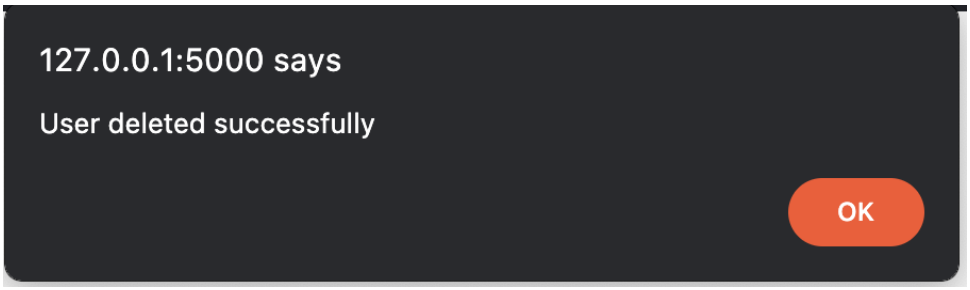


Figure 18: Deleting the value

UPDATE operations

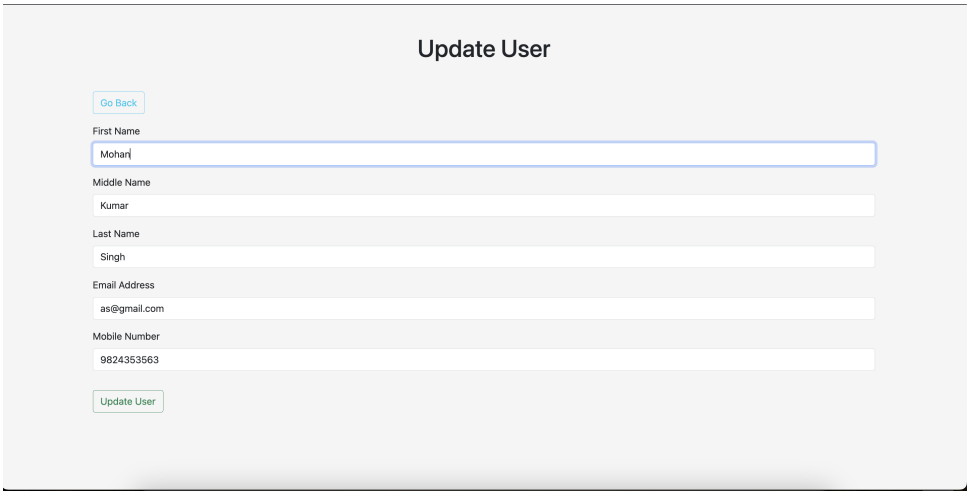


Figure 19: Updating the value

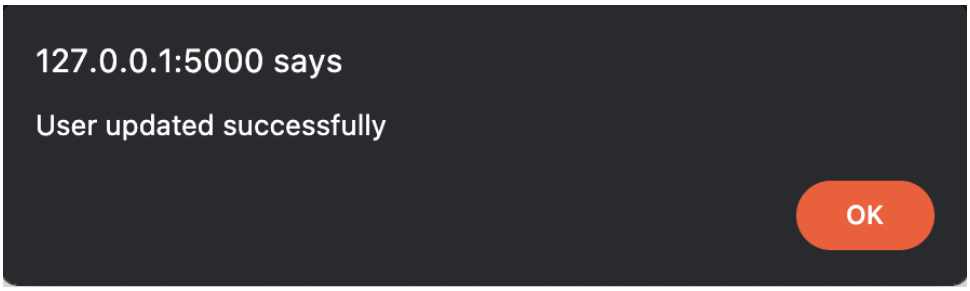


Figure 20: Updated successfully dialog box

147	Shubh			shb@gmail.com	7043236104	Update Delete
149	Narendra	Damodardas	Modi	nm@gmail.com	9876543210	Update Delete
151	Mohan	Kumar	Singh	as@gmail.com	9824353563	Update Delete

Figure 21: Update reflected on the webApp

147	Shubh			shb@gmail.com	7043236104
149	Narendra	Damodardas	Modi	nm@gmail.com	9876543210
151	Mohan	Kumar	Singh	as@gmail.com	9824353563
NULL	NULL	NULL	NULL	NULL	NULL

Figure 22: Update reflected on the database

Operations in Request List

INSERT operation

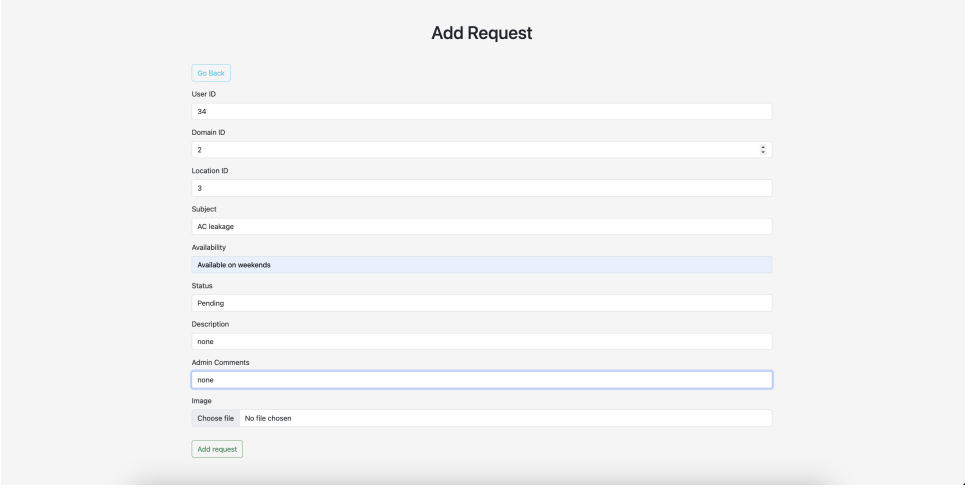


Figure 23: Insert Operation on Request Table

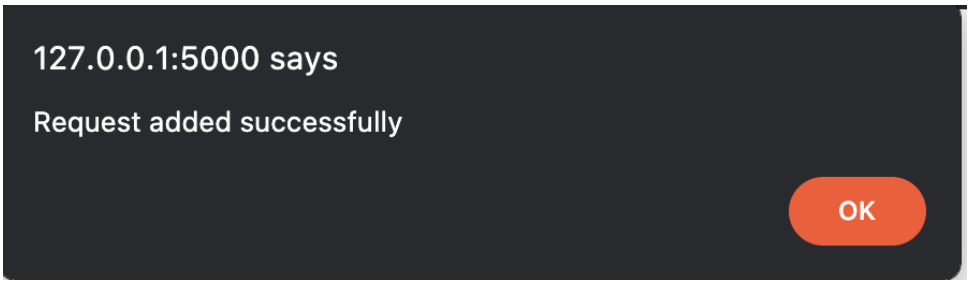
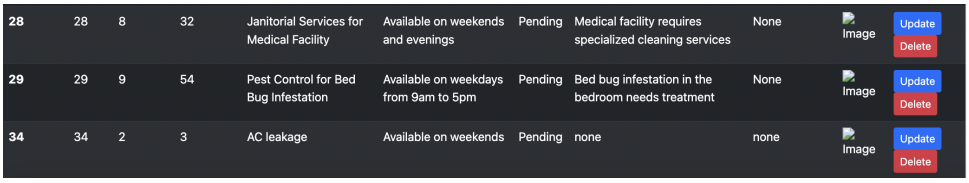


Figure 24: Added Successfully Dialog Box



28	28	8	32	Janitorial Services for Medical Facility	Available on weekends and evenings	Pending	Medical facility requires specialized cleaning services	None	Image	Update Delete
29	29	9	54	Pest Control for Bed Bug Infestation	Available on weekdays from 9am to 5pm	Pending	Bed bug infestation in the bedroom needs treatment	None	Image	Update Delete
34	34	2	3	AC leakage	Available on weekends	Pending	none	none	Image	Update Delete

Figure 25: updated webpage

28	28	8	32	Janitorial Services for Medical Facility	Available on weekends and evenings	Pending	Medical facility requires specialized cleanir
29	29	9	54	Pest Control for Bed Bug Infestation	Available on weekdays from 9am to 5pm	Pending	Bed bug infestation in the bedroom needs
34	34	2	3	AC leakage	Available on weekends	Pending	none
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Figure 26: updated database

DELETE operations

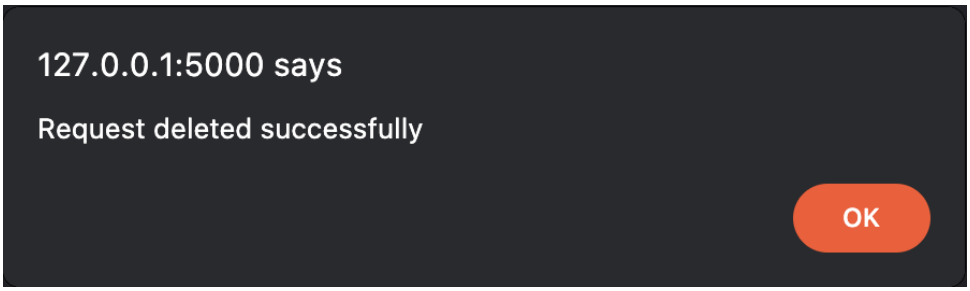


Figure 27: Deleted Successfully Dialog Box

UPDATE operations

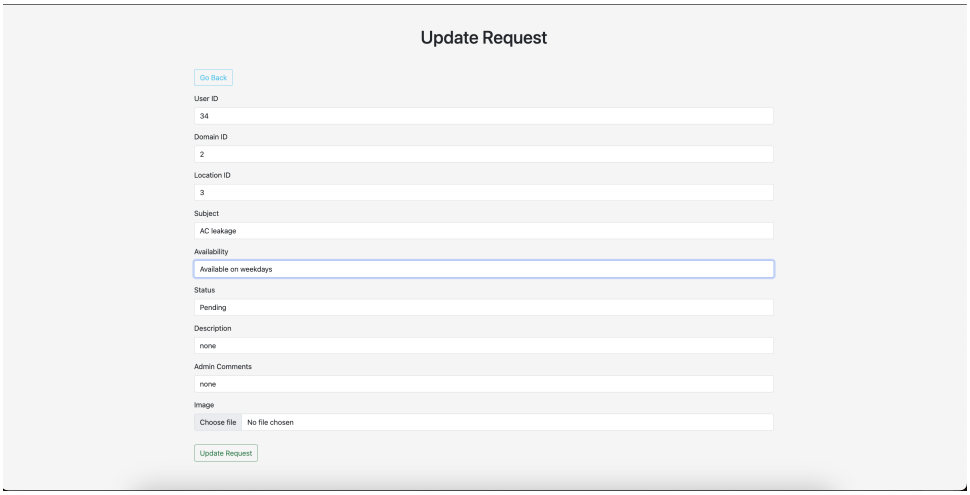


Figure 28: Updating the value

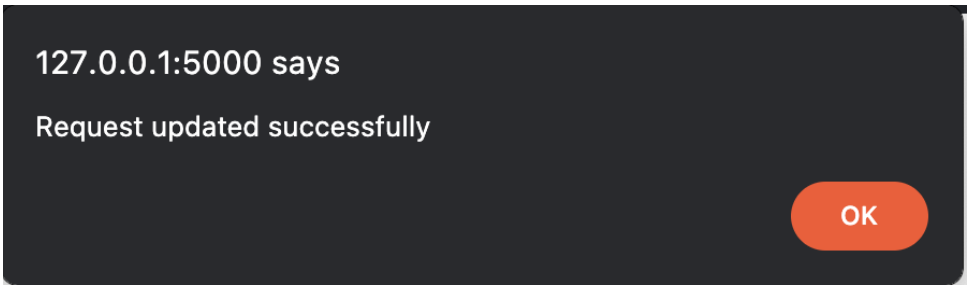


Figure 29: Updated successfully dialog box

28	28	8	32	Janitorial Services for Medical Facility	Available on weekends and evenings	Pending	Medical facility requires specialized cleaning services	None	Image	Update Delete
29	29	9	54	Pest Control for Bed Bug Infestation	Available on weekdays from 9am to 5pm	Pending	Bed bug infestation in the bedroom needs treatment	None	Image	Update Delete
34	34	2	3	AC leakage	Available on weekdays	Pending	none	none	Image	Update Delete

Figure 30: Updated webpage

28	28	8	32	Janitorial Services for Medical Facility	Available on weekends and evenings	Pending	Medical facility requires specialized cleanin
29	29	9	54	Pest Control for Bed Bug Infestation	Available on weekdays from 9am to 5pm	Pending	Bed bug infestation in the bedroom needs
34	34	2	3	AC leakage	Available on weekdays	Pending	none
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Figure 31: Updated database

Operations in Worker List

INSERT operation

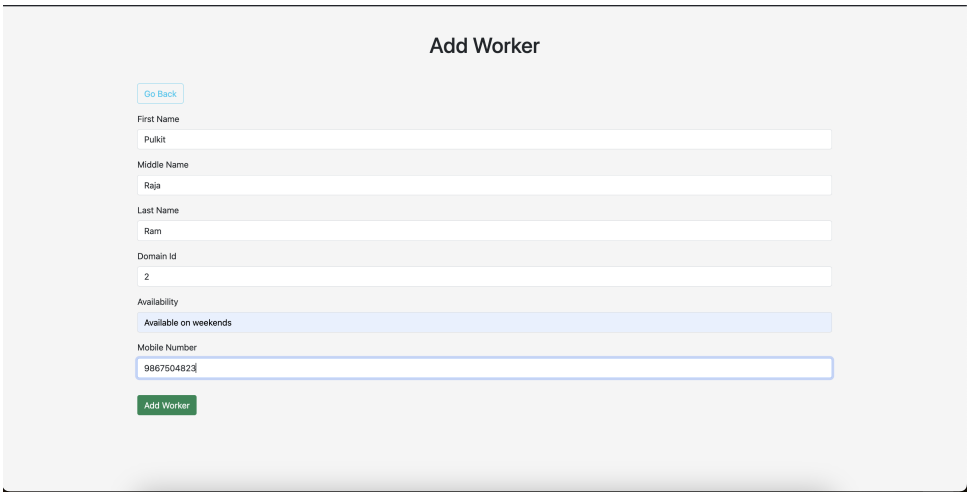


Figure 32: Insert Operation on Worker Table

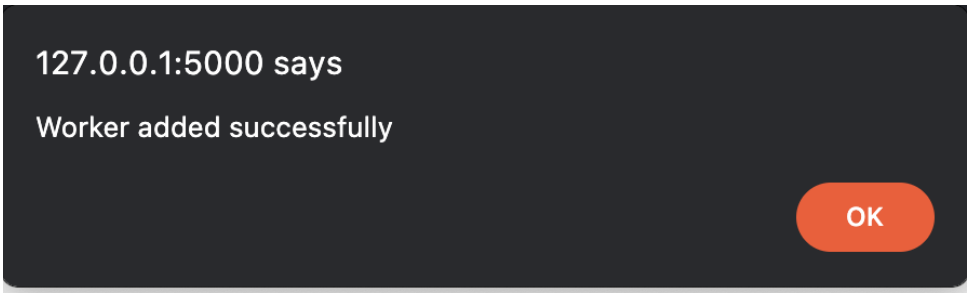
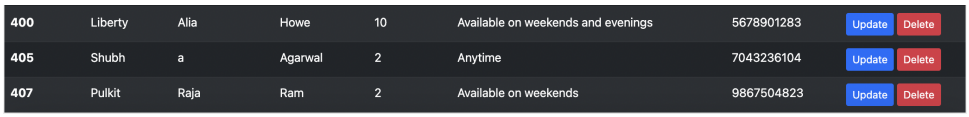


Figure 33: Added Successfully Dialog Box



400	Liberty	Alia	Howe	10	Available on weekends and evenings	5678901283	Update Delete
405	Shubh	a	Agarwal	2	Anytime	7043236104	Update Delete
407	Pulkit	Raja	Ram	2	Available on weekends	9867504823	Update Delete

Figure 34: updated webpage

400	Liberty	Alia	Howe	10	Available on weekends and evenings	5678901283	
405	Shubh	a	Agarwal	2	Anytime	7043236104	
407	Pulkit	Raja	Ram	2	Available on weekends	9867504823	
NULL	NULL	NULL	NULL	NULL	NULL	NULL	

Figure 35: updated database

DELETE operations

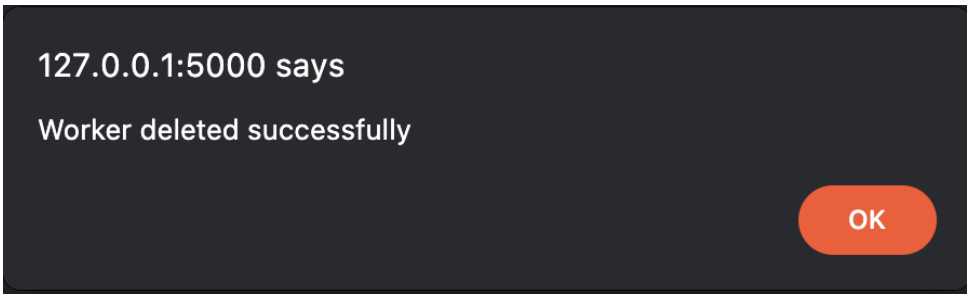


Figure 36: Deleted Successfully Dialog Box

UPDATE operations

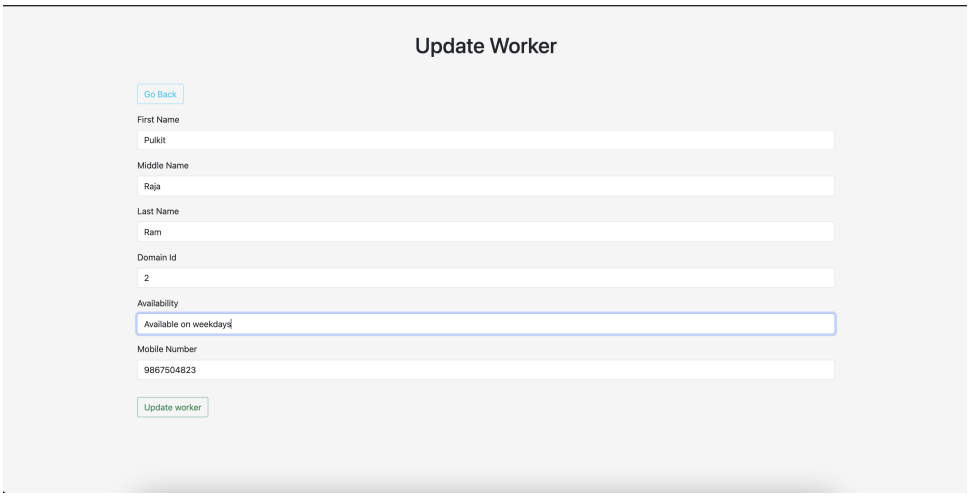


Figure 37: Updating the value

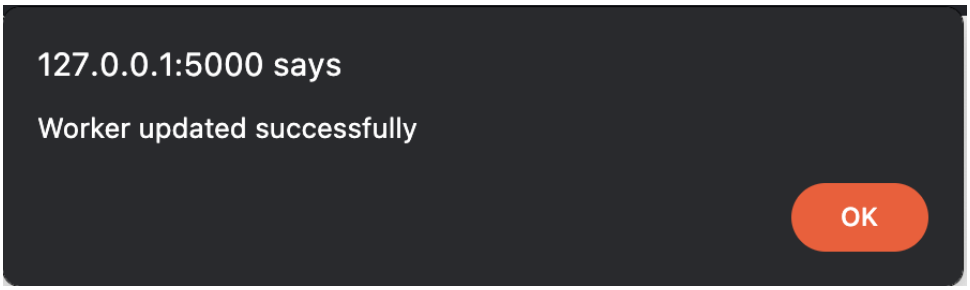


Figure 38: Updated successfully dialog box

400	Liberty	Alia	Howe	10	Available on weekends and evenings	5678901283	Update Delete
405	Shubh	a	Agarwal	2	Anytime	7043236104	Update Delete
407	Pulkit	Raja	Ram	2	Available on weekdays	9867504823	Update Delete

Figure 39: Updated webpage

400	Liberty	Alia	Howe	10	Available on weekends and evenings	5678901283
405	Shubh	a	Agarwal	2	Anytime	7043236104
407	Pulkit	Raja	Ram	2	Available on weekdays	9867504823
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Figure 40: Updated database

Operations in Domain List

INSERT operation

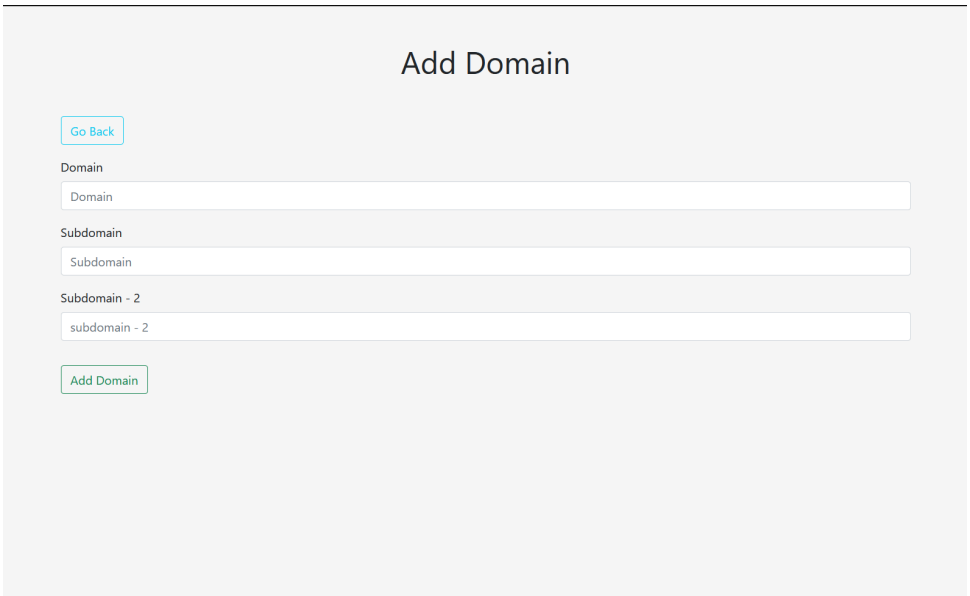


Figure 41: Insert Operation on Domain Table

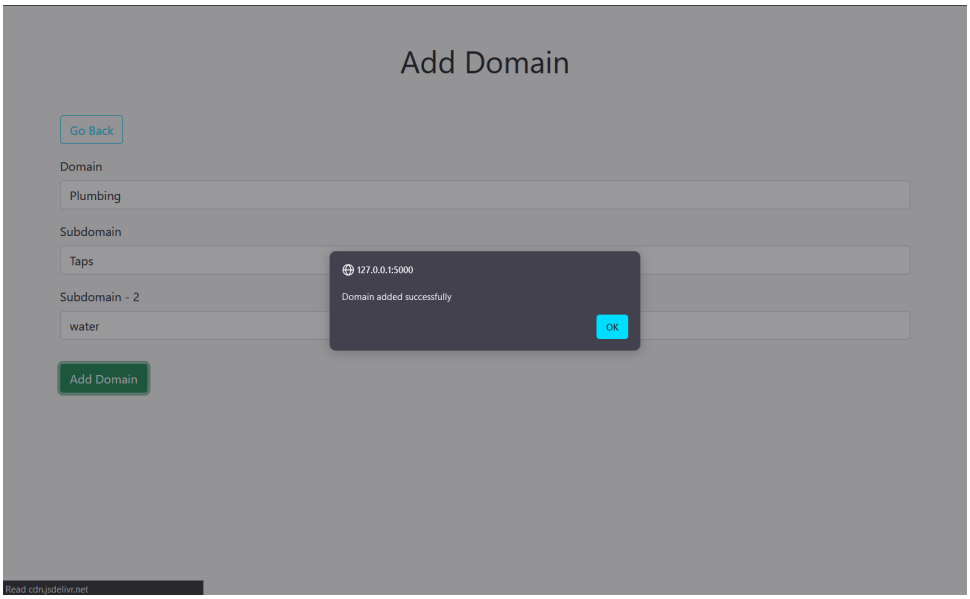


Figure 42: Added Successfully Dialog Box

10	securitysystems	security	systems	Update Delete
12	Electrical	Room	Tubelights Fans	Update Delete
13	Plumbing	Taps	water	Update Delete

Figure 43: Changes reflected on WebApp

```
|          9 | pestcontrol      | pest         | control      |
|         10 | securitysystems  | security     | systems      |
|         13 | Plumbing         | Taps         | liquid       |
+------------+------------------+--------------+--------------+
```

Figure 44: Changes reflected on Terminal

DELETE operations

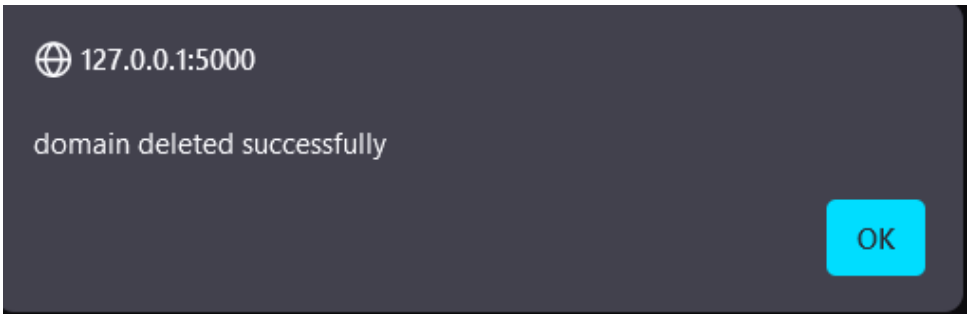


Figure 45: Deleting the value

8	janitorial	janitorial	services
9	pestcontrol	pest	control
10	securitysystems	security	systems

Figure 46: Deleting the value

UPDATE operations

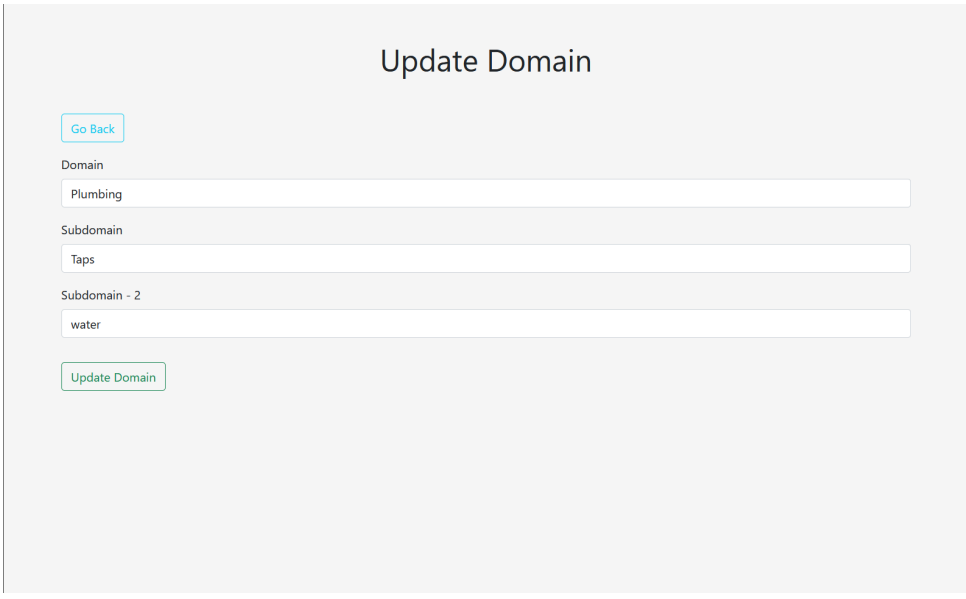


Figure 47: Updating the value

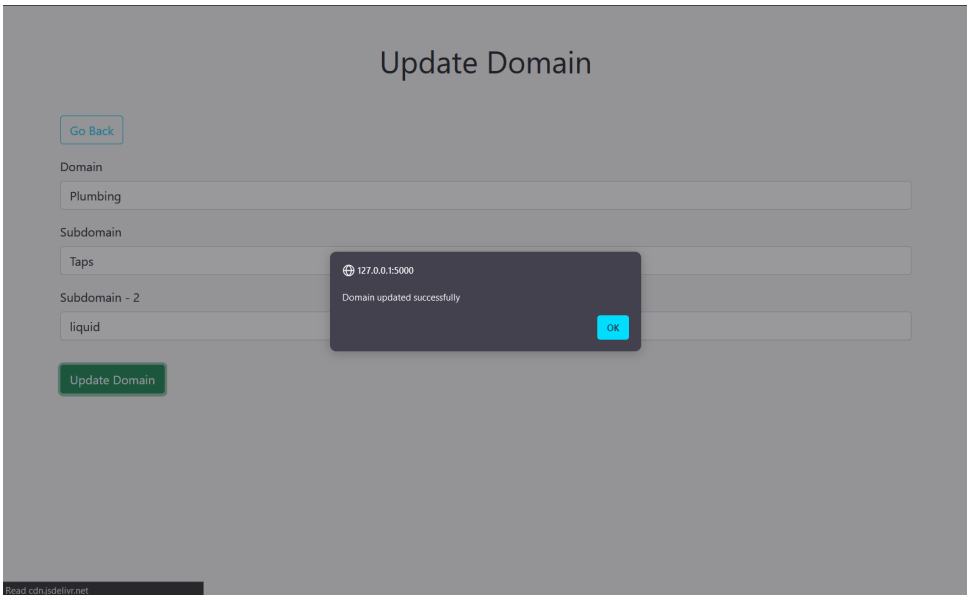
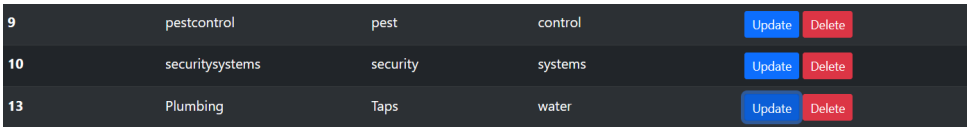


Figure 48: Updated successfully dialog box



9	pestcontrol	pest	control	Update Delete
10	securitysystems	security	systems	Update Delete
13	Plumbing	Taps	water	Update Delete

Figure 49: Update reflected on the webApp

Operations in Location Table

INSERT operations

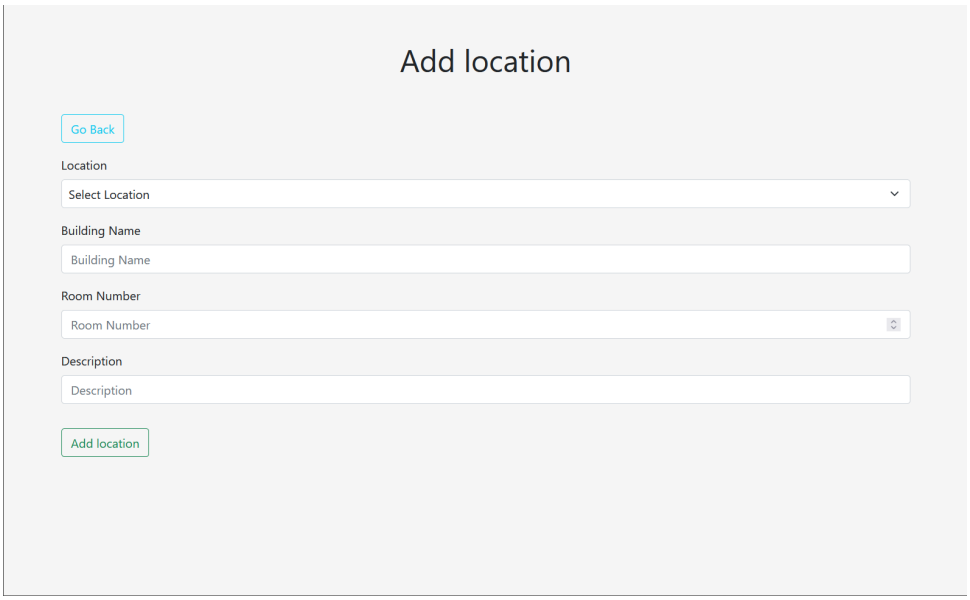


Figure 50: Inserting Values in Location Table

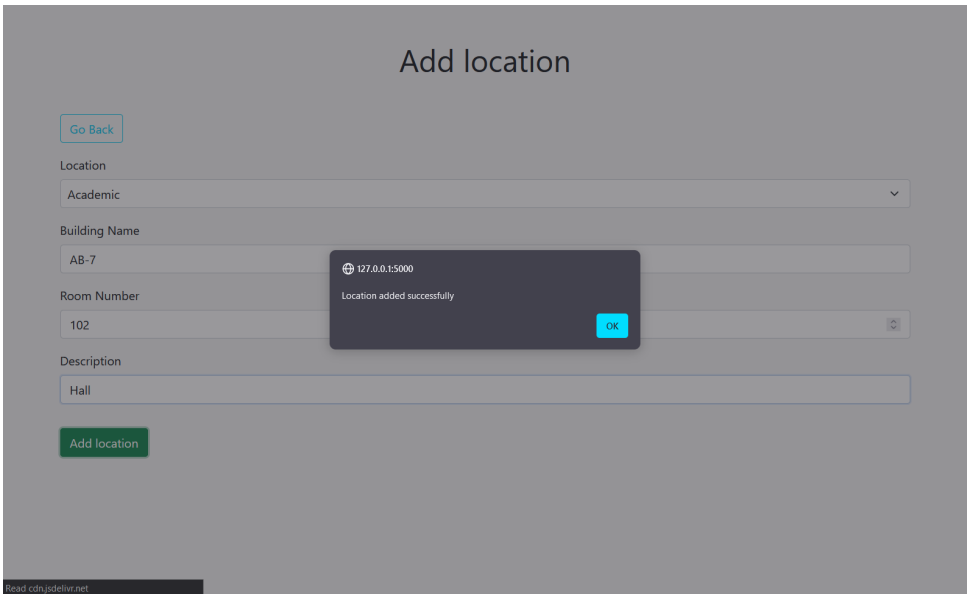


Figure 51: Successfully inserted dialog box

DELETE operation

85	Research Park	Research Park 3	303	Laboratory complex	Update Delete
86	Research Park	Research Park 4	404	Incubation centers	Update Delete
90	Academic	AB-7	102	Hall	Update Delete

Figure 52: Changes reflected in webpage

```
|          85 | Research Park  | Research Park 3     |     303 | Laboratory complex                  |
|          86 | Research Park  | Research Park 4     |     404 | Incubation centers                  |
|          90 | Academic       | AB-7                |     102 | Hall                                |
+-------------+----------------+---------------------+---------+-------------------------------------+
```

Figure 53: Changes reflected in Terminal

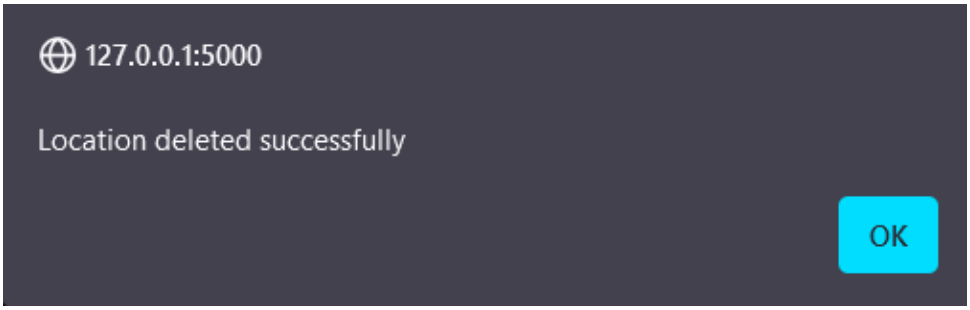


Figure 54: Deleting Values

84	Research Park	Research Park 2	202	Collaborative space	Update Delete
85	Research Park	Research Park 3	303	Laboratory complex	Update Delete
86	Research Park	Research Park 4	404	Incubation centers	Update Delete

Figure 55: Changes Reflected on WebApp

```
|          84 | Research Park  | Research Park 2     |     202 | Collaborative space                 |
|          85 | Research Park  | Research Park 3     |     303 | Laboratory complex                  |
|          86 | Research Park  | Research Park 4     |     404 | Incubation centers                  |
+-------------+----------------+---------------------+---------+-------------------------------------+
```

Figure 56: Changes Reflected on Terminal

UPDATE operation

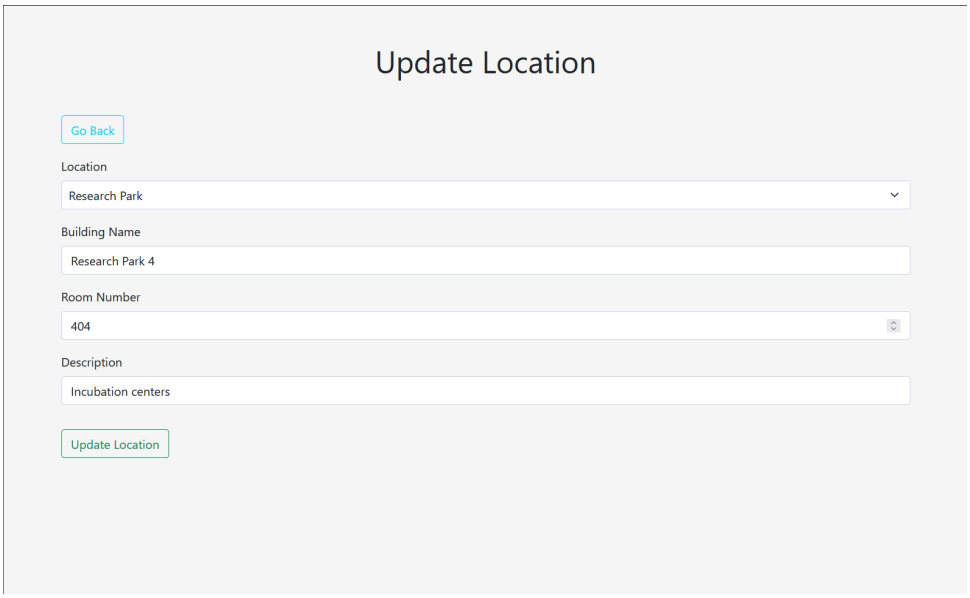


Figure 57: Updating Entries in Location Table

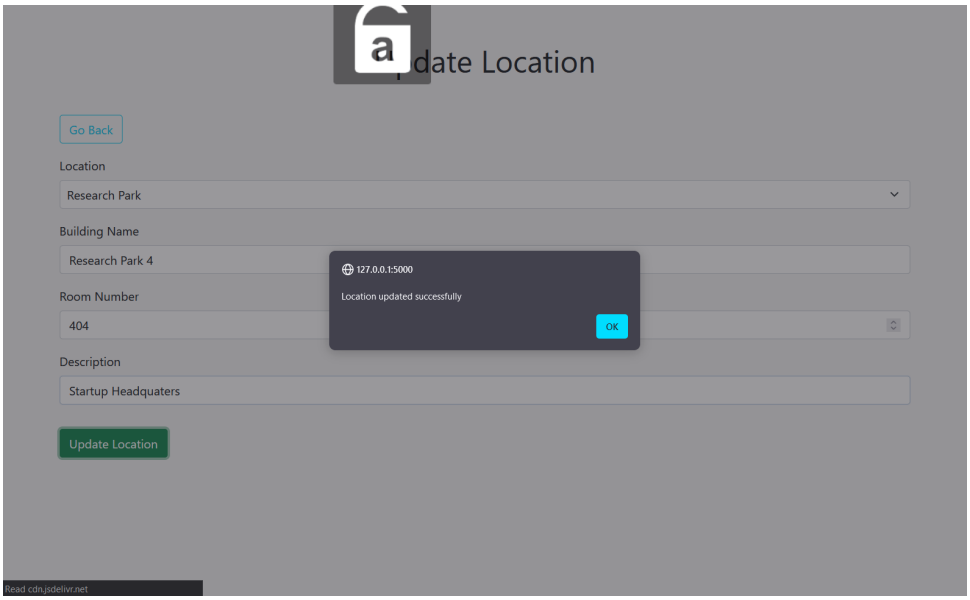


Figure 58: Successfully changed dialog box

84	Research Park	Research Park 2	202	Collaborative space	Update Delete
85	Research Park	Research Park 3	303	Laboratory complex	Update Delete
86	Research Park	Research Park 4	404	Startup Headquaters	Update Delete

Figure 59: Changes Reflected on WebApp

```
|          84 | Research Park  | Research Park 2     |     202 | Collaborative space                |
|          85 | Research Park  | Research Park 3     |     303 | Laboratory complex                 |
|          86 | Research Park  | Research Park 4     |     404 | Startup Headquaters                |
+-------------+----------------+---------------------+---------+------------------------------------+
```

Figure 60: Changes Reflected on Terminal

Contributions

Group 1

- **Pulkit Gautam:** Led Group 1, designed the overall structure of the frontend. Helped with integration of key features. Also, contributed to the documentation.
- **Manav Parmar:** Responsible for designing the frontend for the Request Page and Worker Page. Also, contributed in the documentation.
- **Gaurav Rawat:** Responsible for designing the forms and helped with the documentations.
- **Hrishikesh Birje:** Responsible for designing User and Domain Page.

Group 2

- **Shubh Agarwal:** Led Group 2, designed the overall structure of the backend, worked on integrating the frontend with the backend, as well as integrating Flask with MySQL. Also responsible for writing APIs for the Login and User Table.
- **Atal Gupta:** Responsible for writing APIs for the Request and Worker Tables. Worked on sending and displaying images from the backend to the frontend. Also contributed significantly to the documentation.
- **Ishva Patel:** Wrote APIs for the Location Table and assisted in integrating MySQL with Flask. Also provided support for documentation tasks.
- **Aman Singh:** Developed APIs for the Domain Table and assisted in integrating MySQL with Flask. Also played a role in documentation efforts.