Optimizing College Exam Hall Seating: Implementation with Python Django Framework

Mr.P.Hemanth Lakshman [1], Ms. D. Sasi Rekha[2] , Ms.P.Dhanumjaya [3], Ms.P.Swetha Kamala [4], Mr.M.Ahammad Shakeer [5] ,Mr.M.Rohith[6],

[1]B.Tech Student, Department of CSE, Sri Vasavi Engineering College(A),Pedatadepalli, Tadepalligudem – 534101.

[2]Sr. Assistant Professor, Department of CSE, Sri Vasavi Engineering College(A),Pedatadepalli, Tadepalligudem – 534101.

[3]BTech Student, Department of CSE, Sri Vasavi Engineering College(A),Pedatadepalli, Tadepalligudem – 534101.

[4]B.Tech Student, Department of CSE, Sri Vasavi Engineering College(A),Pedatadepalli, Tadepalligudem – 534101.

[5]B.Tech Student, Department of CSE, Sri Vasavi Engineering College(A),Pedatadepalli, Tadepalligudem – 534101.

[6]B.Tech Student, Department of CSE, Sri Vasavi Engineering College(A),Pedatadepalli, Tadepalligudem – 534101.

Email: hemanthpatcha55555@gmail.com

Corresponding authors Email: rekhasasi08@srivasaviengg.ac.in, penjarlaswetha03@gmail.com, shakeerahmmad36@gmail.com, rohithmedikonda0@gmail.com, pusala.dhanumjaya06@gmail.com

Abstract:

The objective of this mini project is to design and develop a website that streamlines the process of creating examination seating plans for students, reducing the dependency on manual labor and automating the overall workflow. The website will serve as a centralized platform for managing and organizing seating arrangements, enhancing efficiency and accuracy. The website will provide a user-friendly interface for administrators or exam coordinators to input relevant information, such as the number of students, available seating capacity, and any specific requirements or constraints. The system will then intelligently generate optimized seating plans based on these inputs, considering factors such as student preferences, course allocations, and seating capacity limitations. By automating the seating plan generation process, the website will significantly reduce the time and effort traditionally spent on manually assigning seats for examinations. This automation will enable administrators to allocate their resources more effectively and focus on other crucial aspects of exam management.

Keywords:
Exam seating arrangement, Python, Django, web technologies. Automated,

1. INTRODUCTION

Examinations are important events in any educational institution, demanding careful attention, planning and organization to ensure fairness and integrity. Traditional methods of managing seating arrangements are often time-consuming and sometimes leads to

unappropriated seating. This exam seating arrangement system arranges the seating plan of the students without leading any inconvenience. Examination seating arrangement system gives page out results under all circumstances, once the data collection is over. Our system manages everything perfectly. Our system reduces the manual effect and speeds up the processing of results.

Organizing examinations in educational institutions is a complex and pivotal task. One crucial aspect of this process is the systematic arrangement of students in the exam hall, ensuring fairness, efficiency, to various constraints. Traditional manual methods and automatic methods of creating seating plans are not only time-consuming but also prone to errors. To address these challenges and usher in a new era of efficiency and adaptability, this paper introduces a cutting-edge solution: the Exam Hall Seating Arrangement System using Python Django.

Python Django, a powerful web development framework, serves as the backbone of our system. It provides the flexibility and scalability needed to create a dynamic and user-friendly platform for managing exam seating arrangements. In this paper, we will delve into the various aspects of our system, explaining how it revolutionizes the way exams are conducted in educational institutions.

In the following sections, we will explore the key features and functionalities of our system, highlighting its ability to automate seat allocation, provide real-time updates, resolve conflicts, and ensure accessibility for all students. Moreover, we will discuss the system's security measures to protect sensitive student and exam data.

This paper aims to demonstrate how the Exam Hall Seating Arrangement System using Python Django brings efficiency and fairness to the often-daunting task of arranging seats for exams. By harnessing the power of technology, we not only reduce administrative burdens but also create a conducive environment for students to perform at their best. This introduction sets the stage for a comprehensive exploration of our innovative solution, illustrating its potential to transform the examination process in educational institutions

2. LITERATURE SURVEY

The most important step in the software development process is the literature review. This will describe some preliminary research that was carried out by several authors on this appropriate work and we are going to take some important articles into consideration and further extend our work.

S Subhashini, Dr. J. Sree Rambabu, M. Mohammed Riyaz [7], proposed a research article," S. Subhashini ,developed a webportal for online exam hall seating arrangement to arrange students seating automatically using php and SQL.

Ku.Vaishnavi [8], proposed a research article," Ku.Vaishnavi,developed a webportal for online exam seating arrangement to arrange students seating automatically using php and SQL. The limitation is this will work only for universities only.

A.H Nandhu Kishore, A.Sasireka, K Vijay [9], proposed a research article," ,developed a project on design and development of Enhanced Exam Hall Seating Arrangement Automation System using xampp sever and PHP and MySQL database. The system have many modules for campus registeration staff details etc.

S.S.Aravinth, G.Pavithra, [10], proposed a research article," S.S.Aravinth,developed a web interface for exam hall seating arrangement using PHP to arrange students seating automatically. Students can view their seating place and teacher can see whole class arrangement The limitation is this will work only for universities only.
Dinesh Chandewar[11],, proposed a research article, "Automatic Seating Arrangement of University Exam,"developed a systematic approach based on key features, including room availability, the number of students, and seat allocation. Their method results in an organized graphical structure that significantly enhances the efficiency and reliability of the seating arrangement process for university exams, streamlining tasks and providing a more efficient solution for educational institutions.

3. EXISTING SYSTEM

In the existing system for the exam seating arrangement is some colleges are still using manual methods and many colleges shifted to automatic arrangement system but it is specified to the respective college and some automatic arrangement system is still time taking process and have the following problems

1. Firstly, technical glitches or malfunctions in the automated system could disrupt the seating arrangement process. This could lead to confusion and delays on exam day, causing inconvenience for both students and administrators.

2. Secondly, automation may introduce the risk of potential bias in seating assignments. If the automated system is not properly calibrated or takes into account certain factors that could unintentionally favor or disadvantage certain students, it could result in an unfair distribution of seating arrangements.

3. While automation can bring efficiency and convenience to the exam seating process, it's important to address these potential disadvantages and ensure that the system is reliable, fair, and takes into account the needs and concerns of all students.

4. PROPOSED SYSTEM

- As there are many drawbacks in the existing system, we are proposing a new system. This system aims to give the automatic exam seating arrangement plan which ensures fairness.

Principal features of our proposed work include:

- **Authentication and Authorization:** Implement authentication and authorization to control access to the system. Define user roles (e.g., administrators, students) and restrict access based on these roles.

  To ensure secure access to the exam hall seating arrangement system, a robust authentication and authorization mechanism has been implemented. Within the Django framework, user authentication is achieved through the utilization of its built-in authentication system. This involves secure password storage, session management, and the use of tokens to validate user identity.

Role-based access control (RBAC) is employed to define user roles and restrict access accordingly. In the system, roles such as administrator, faculty, and student are clearly defined. Each role is associated with specific permissions, determining what actions users of that role can perform. This is achieved through Django's powerful authorization system.

- **Generate Seating Arrangements:** Create a feature that allows administrators or teachers to allocate seats for each exam. we can implement the algorithm to automatically allocate seats

  An automated algorithm is utilized to assign seats efficiently. Factors taken into account include course allocations, and seating capacity limitations. The algorithm aims to optimize seating arrangements based on these factors while ensuring fairness and avoiding conflicts.

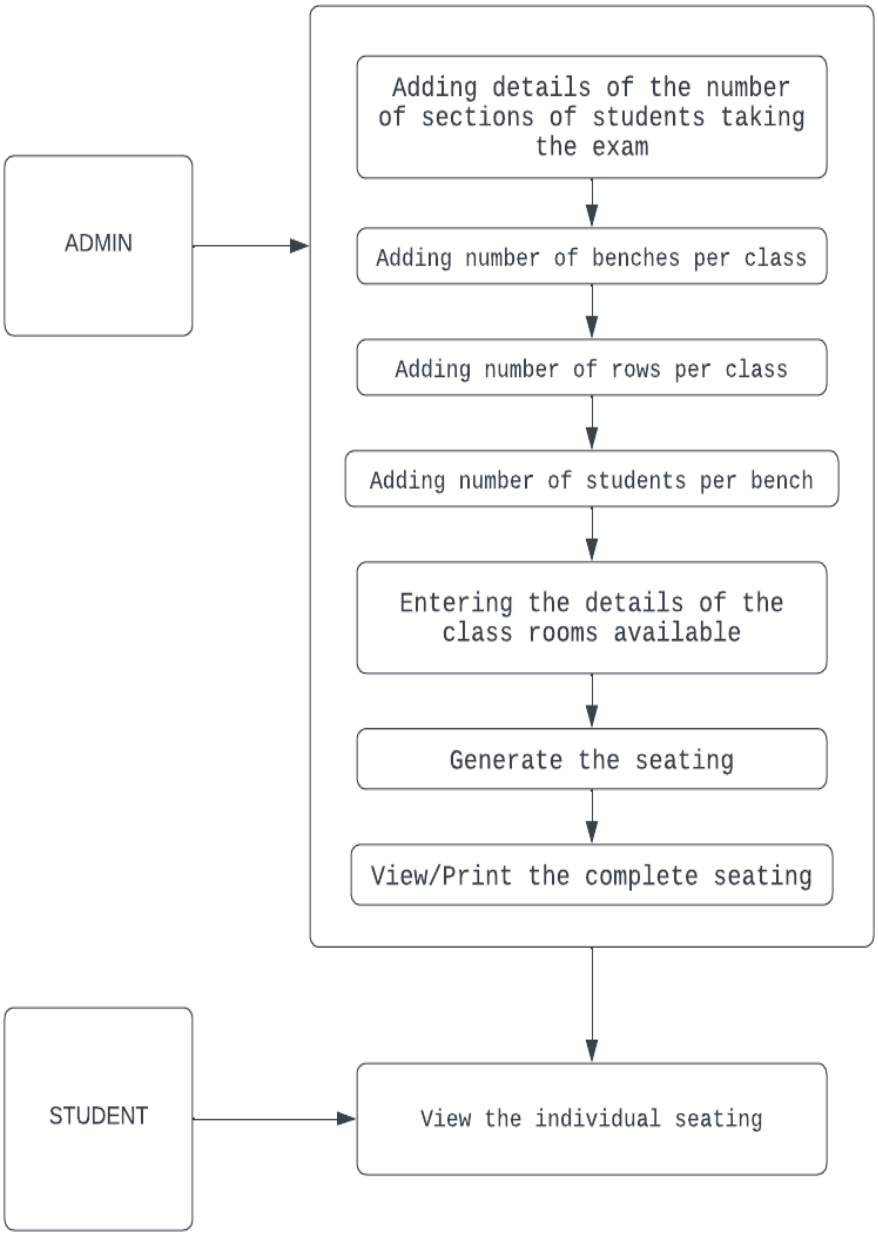
  Course allocations are considered during the initial seat assignment, and the algorithm adjusts for any conflicts that may arise. The system provides a transparent and fair approach to seat allocation, taking into account the constraints of both students and available seating.

- **View and Print Seating Arrangements:** Provide a way for users to view and print seating arrangements in a user-friendly format. You can use Django's template rendering for this purpose.

- **Security and Data Integrity:** Implement security measures to protect sensitive data and ensure data integrity. Use Django's built-in security features.

  The system employs comprehensive security measures to protect sensitive student and exam data. Django's built-in security features, such as protection against common web vulnerabilities, are actively utilized. Additionally, data encryption is implemented to safeguard confidential information during transmission and storage.

  Access control mechanisms ensure that only authorized personnel can access specific functionalities and data within the system. Regular data integrity checks are performed to identify and mitigate any unauthorized modifications. The combination of these measures guarantees a high level of security for the entire exam hall seating arrangement system.



- **Figure1. Denote the Proposed Flow Diagram**

PROPOSED DATA SET:

In this system we store the student seating in a table to display their allotted seat

The table consists of following attributes

	id	num	rollno1	rollno2	rownum	colnum	classnum
Edit Copy Delete	2737	1	cse-a-1	mech-a-1	0	0	1
Edit Copy Delete	2738	2	cse-a-2	mech-a-2	0	1	1
Edit Copy Delete	2739	3	cse-a-3	mech-a-3	0	2	1
Edit Copy Delete	2740	4	cse-a-4	mech-a-4	0	3	1
Edit Copy Delete	2741	5	cse-a-5	mech-a-5	0	4	1
Edit Copy Delete	2742	6	cse-a-6	mech-a-6	0	5	1
Edit Copy Delete	2743	7	cse-a-7	mech-a-7	1	0	1
Edit Copy Delete	2744	8	cse-a-8	mech-a-8	1	1	1
Edit Copy Delete	2745	9	cse-a-9	mech-a-9	1	2	1
Edit Copy Delete	2746	10	cse-a-10	mech-a-10	1	3	1
Edit Copy Delete	2747	11	cse-a-11	mech-a-11	1	4	1
Edit Copy Delete	2748	12	cse-a-12	mech-a-12	1	5	1
Edit Copy Delete	2749	13	cse-a-13	mech-a-13	2	0	1
Edit Copy Delete	2750	14	cse-a-14	mech-a-14	2	1	1
Edit Copy Delete	2751	15	cse-a-15	mech-a-15	2	2	1

Console

From the above fig we can see the student details where the seating is placed rownum indicates the which bench he is placed and colnum shows the place in that bench

Figure 2. Represent the Dataset Column Description

PROPOSED METHODOLOGY:

In this project, we are using the graph colouring algorithm to arrange the seating for the students the steps are

Seating arrangements are dynamically generated based on the allocated seats. The graphical representation of seating plans is implemented using Django's template rendering system, providing a user-friendly and visually appealing interface. The system offers options for users to view and print seating arrangements, enhancing accessibility and convenience.

Django's template rendering system allows for the customization of the visual representation of seating plans, making it adaptable to various exam scenarios. This ensures that users can easily interpret and navigate the seating arrangements, facilitating a smooth examination process.

1. **Graph coloring algorithm**

   In this project we use graph coloring algorithm for student exam seat arrangement every student is represented as a node and the edges between nodes represent constraints or relationships (e.g., students who should not be seated close to each other). to assign a color (representing a seat) to each node (student) in such a way that no adjacent nodes (students with constraints between them like course code etc.) share the same color (seat). This ensures that no two students with a constraint (course code) are seated adjacent to each other.

   The graph coloring algorithm used for student exam seat arrangement is a key component of the system. Students are represented as nodes in the graph, and constraints, such as proximity preferences or course-specific requirements, are represented as edges between nodes. Colors are assigned to nodes to represent seats, ensuring that adjacent nodes (students) do not share the same color (seat).

   The optimization techniques employed in the graph coloring algorithm focus on achieving efficient and fair seat allocation. These techniques include heuristics to reduce conflicts and a dynamic adjustment mechanism to accommodate changing preferences or constraints. The algorithm is designed to handle various scenarios, providing a flexible and adaptive solution for diverse examination settings.

2. Collect all the necessary inputs like number of branches who are writing exam to generate seating

3. Collecting the branch details like strength of class and the exam code to arrange them.

4. Collecting class details like number of benches in a class and number of students per bench

5. Calculate the number of class rooms required.

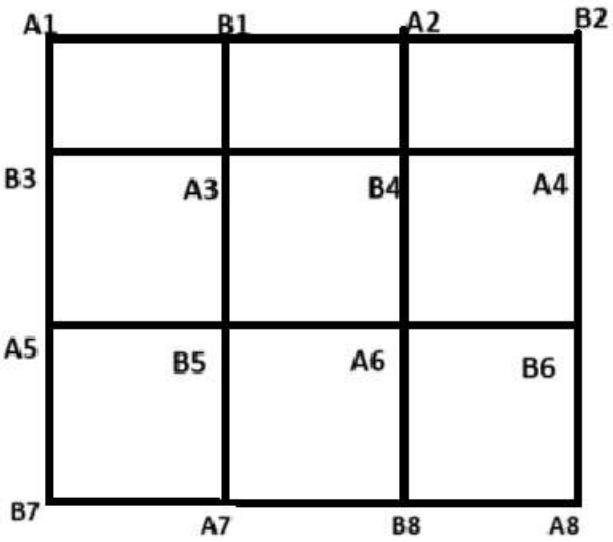
6. Each student will be created as an object and will randomly be assigned to a seat in a class.

7. Validations will be written such that no two students taking the same exam or same branch will sit next to each other.

8. After giving above details, the admin can view/print the seating plan for the exam.

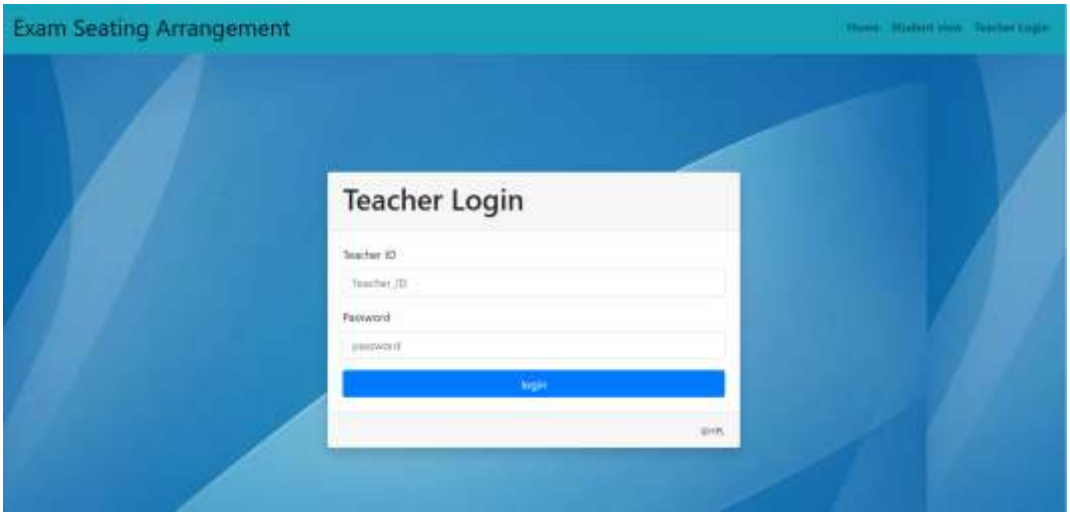
9. Seating plan will be presented as rows and columns where each element represented as student

10. Upon generation of the arrangement by the admin, a user can simply use a webpage to enter their roll number and view their seating.



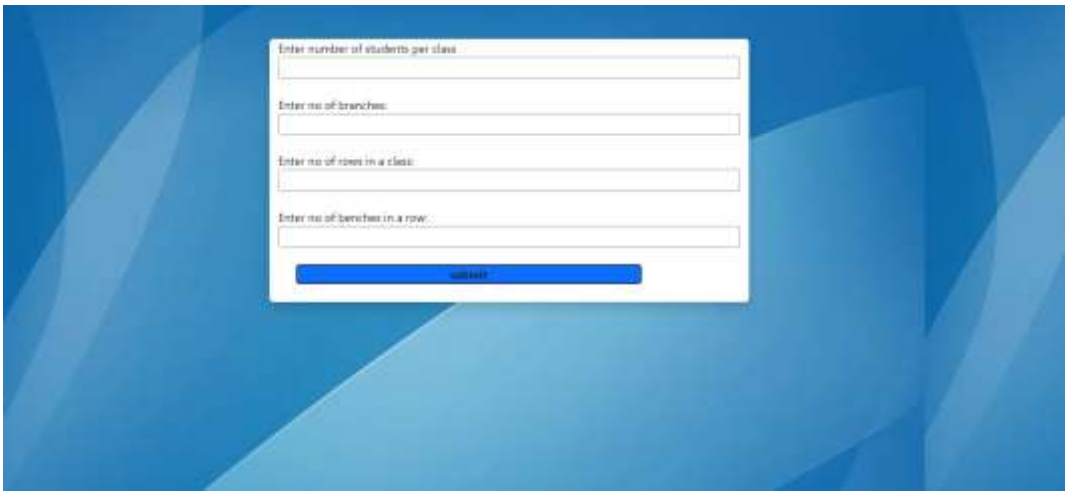
The above fig represents there are two different branch students having two different course code are placed as no two adjacent nodes (seats) have same color (branch / course code)

5. EXPERIMENTAL RESULT



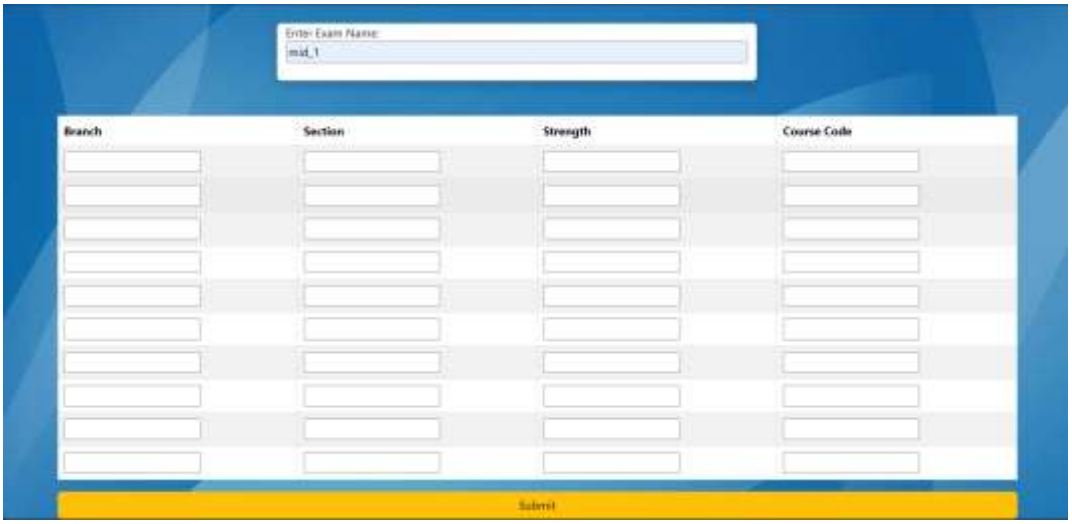
Fig(a)

The fig(a) is the faculty login page where faculty can login and manage the seating arrangment. After login faculty can give the details to arrange the seating for the exam



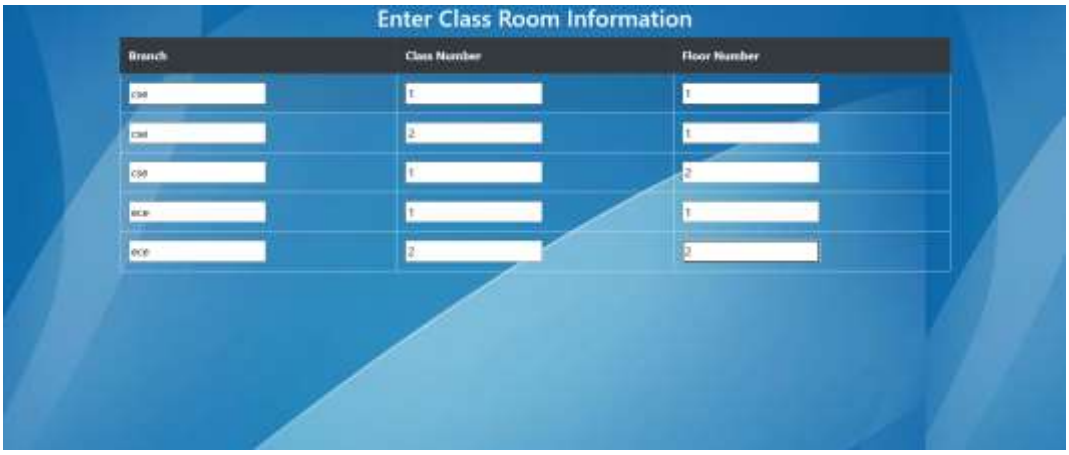
Fig(b)

In the above fig(b) faculty need to assign the details how many branches are taking the exam and the strength of each branch and no of benches in a class and no of rows of benches in a class



Fig(c)

The above fig(c) shows that the faculty need to give the input of branches who are taking the exam and their exam code

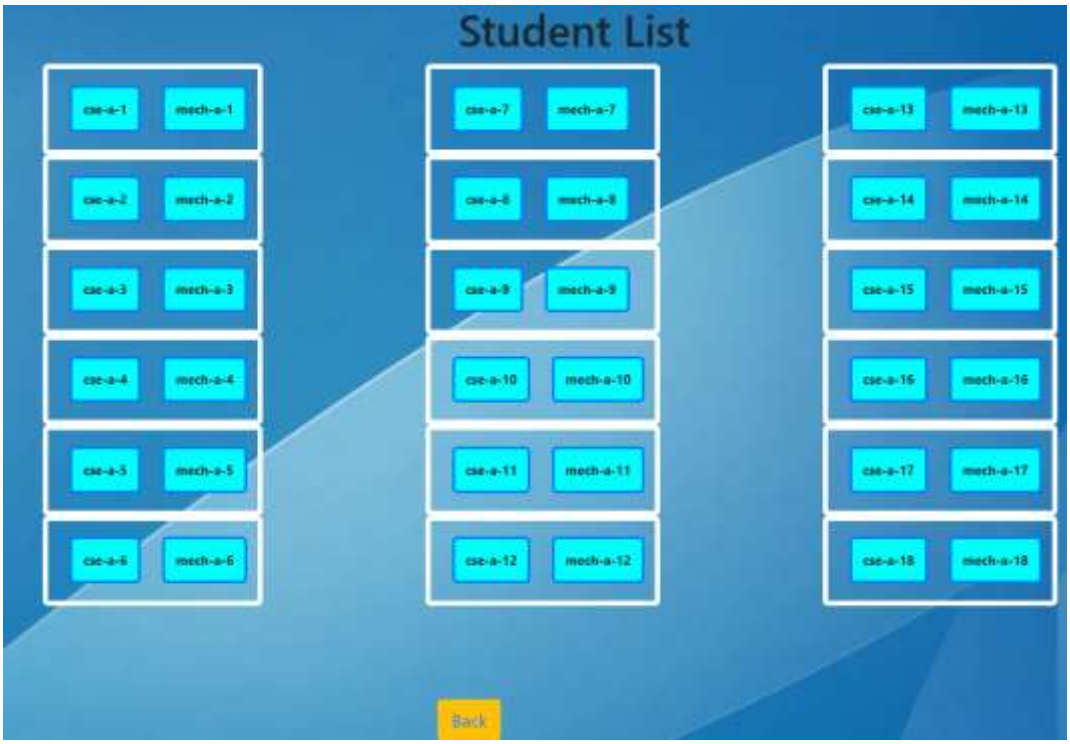


Fig(d)

From the above fig(d) the system calculte the no of rooms requried for the seating arrangments and display in the dable now the faulty need to give the details of the classes to be allocated

Fig(e)

From the fig(e) we can see the class seating details there will buttons to see the class details each button represents each class



Fig(f)

From the above fig(f) we can see the arrangments of student seating in a class each box represents each bench and their place

Fig(g)

From the fig(g) we can see that student seating view page student can see their exam seating through their rollnumber

Fig(h)

From the above fig(h) we can see the the student seating page he can see the room details and his place in the room

6. CONCLUSION

In conclusion, our Exam Hall Seating Arrangement System, powered by Python Django, revolutionizes the organization of seating plans for educational exams. This paper has highlighted its key features and transformative potential.

Built on the robust Python Django framework, our system offers a dynamic, user-friendly platform for reimagining seating arrangement management. It automates seat allocation, enables real-time updates, resolves conflicts efficiently, and ensures accessibility, all while maintaining stringent data security.

This system streamlines administrative processes, reducing time and effort. It fosters fairness by accommodating student preferences and special needs, enhancing efficiency through real-time adaptability, and promoting inclusivity.

For educational institutions and assessment bodies, our system provides a scalable, tailored solution. It simplifies tasks and improves the exam experience for both administrators and students.

In the evolving landscape of education and assessment, our Exam Hall Seating Arrangement System signifies technology's potential to enhance efficiency, fairness, and accessibility. It paves the way for innovative, user-friendly solutions to complex logistical challenges, inspiring further adoption across sectors.

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