Design of Class Routine and Exam Hall Invigilation System based on Genetic Algorithm and Greedy Approach

Abstract

A classroom routine is nothing more than a well-practiced respond to a teacher's instruction. It's one of a teacher's key labor-saving strategies to improve the overall institution performance. Most universities handle this allocation process with a manual procedure. The manual procedure gives various challenges and is inclined to mistakes. A better approach to reliably schedule class routine is to utilize a computer assisted web-based system. Therefore, in this work, focus is given on creating automatic class routines with teacher's requirements. This work mainly consists of two parts or two panel, named Admin panel and User panel. In admin panel we get some information like courses information, teacher's information, room's information etc. We can Update, Delete & Add this information. A class routine is then created based on these fields. In user panel, we get all of information about courses, associated teacher and rooms. In this panel we can see all this information & routine. Routine can be constructed by days, teacher's and semester wise. We create this application by utilizing genetic algorithm, and implemented by using Python language. This application is created to reduce the complexity of routine creation manually, and to reduce routine version. Exam Hall Invigilation is another aspect which still most universities handle manually. Therefore, an automatic Exam Hall Invigilation Management System is developed in this work. We propose an improved algorithm to achieve automatic examination arrangement for invigilator based on greedy method. The algorithm can support the priorities better, set maximum frequency of invigilating and satisfy other personalization examination arrangement requirements. In addition, it can configure to allocate any numbers of invigilators in different examination halls in such a way that each invigilator will get equal number of duties. This algorithm has written and implemented in Java-script language.

Keywords: Class Routine, Routine Allocation System, Web Based Application, Exam Hall Invigilation System, Genetic Algorithm, Greedy Approach.

1. INTRODUCTION

Fifth-generation computers work with Artificial Intelligence methods for decision-making optimization and many other uses. Now that technology has evolved really quickly for a few days, it's having a significant effect on our everyday lives. The class routine allocation and examination hall surveillance project are a software application and an online network to build an automatic framework with the requirements of teachers and students. It is an information-oriented medium. Creating such platforms is very useful for teachers to check for the ID of the instructor, their classification, subjects, and students with this class, semester, and class time per week. The most common issue in instructive founded is the timetable issue. It is considered as Non-deterministic Polynomial (NP) issue. There are a diverse number of timetable issues within the writing based on the sort of established. There are three primary classifications of timetable displayed as takes after:

Subject timetable: It is concerned with the planning for the speaker per semester at the college. It considers around minimizing the confliction of teacher classes and common understudy gather.

School timetable: It is concerned with the week-by-week lesson planning and dodges any instructor to meet more than one course at the same time.

Examination timetable: It is concerned with the planning of the exams for the college subjects and maintains a strategic distance from covering of subjects.

Most instructive teach physically make their schedules by employing a human asset to work on it. A few educate make such administration framework for their individual prerequisite and utilize as it were whereas others do it physically. Routine Allocation Framework will offer assistance instructive educate to make and keep up the schedules in a more compelling and productive way.

Invigilator framework for examination is challenging errand due to a number of components that cannot be maintained a strategic distance from. Variables of a number is cannot to be maintained a strategic distance from amid due the errand of challenging. The think this work is burden them. Another reason is the number of invigilation's obligations between the crevices between isn't fulfilled. Invigilator framework is the moment issues articulations of any examination. Amid the draft planning for timeslot of the one room or more than are doled out in these issues. The invigilators will be a lot of imperatives time and room that got to be watched invigilators out some time recently the final draft. The invigilators are a relegating to examination rooms for included the third problems. This issue has received because it less consideration than examination timetabling issue. The greatest number of invigilation obligations based on invigilators surpass is another issue explanation in invigilator framework. At slightest two- or three-day hole ought to be in planning invigilator allude to proposal from them. The final step is to organize invigilator, as Figure 1. shows.

Schedules and exam corridors concur understudies to quick wrap up common put errands that are required of both the instructor and understudies. There are colossal benefits of our extend framework and benefits get both understudies and instructors. Benefits of this venture is that a look alternative for understudies and instructors, course cancel choice for instructors, additional look alternative for purge room, recognize cover lesson, can include additional lesson, can distinguish teacher's id, their assignment. From this framework will be planning to offer assistance the scholastic administration division within the portion isolation of obligations in invigilator framework. This result of this framework will be given to the invigilator are fulfilled. In this way, this will move forward the invigilator are cheerful in their obligations. At last, have a report print choice that understudy or educator can print the record. The framework recipients are understudies and teachers.

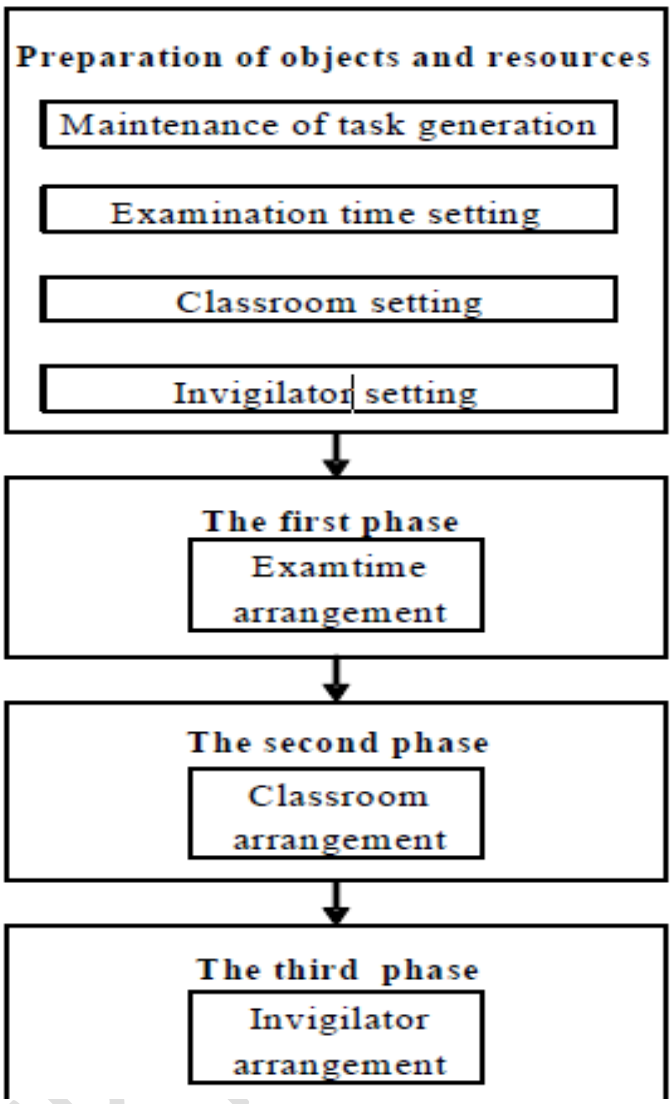

Figure 1: Flow Chart of Invigilation Scheduling.

2. RELATED WORK

Classroom technologies, definition scheduling invigilators, timetable invigilator is very important topic for our literature review. A good automated timetabling survey is given in [1]. Sandhu [2] gives in his thesis a strong literature survey on timetabling techniques. In timetabling generations, he presented different techniques and algorithms used. GA is one of the most common optimal scheduling solutions [3, 4]. GA is a natural selection and evolution-based heuristic algorithm [5]. Class Routine Allocation System Control is applied. Ehsan, Zahra, and Mohammad [6] analyzed routine scheduling as a real method at Iran's Islamic Azad University. To fulfill all the constraints of automatically producing the timetable, they used hybrid algorithms. Chinnasri et al. [7] contrasted and assessed Partially Matched Crossover (PMX), Cycle Crossover (CX) and Order Crossover (OX) operators using GA for the University Course Timetabling Problem (UCTP). At Rangsit University, Thailand, they investigate real UCTP to classify the different probability of mutation, crossover with different number of generations.

By using the genetic algorithm combined with heuristic quest, Lukas et al [8] suggested a method for solving this time table problem. The method of Exam Hall Invigilation Management includes user Id management, instructor Id, teacher identification, and assignment of rooms to invigilate [9]. The allocation of rooms during the analysis can be automated using the algorithm of greedy approach [10]. Using the greedy approach algorithm [11], the authors proposed a method for scheduling the exam hall invigilation time table. The authors here realized user registration, security authentication, test, declaration, sourcing, etc. [12]. This paper also explains automated algorithm development and addresses machine security [13].

The system will increase patient throughput and use radiological services effectively here [14]. Here are automated the various examination system tasks that are performed manually, such as time table generation, searing allotment, invigilator allotment. But the moderator chooses the dates and rooms at which the faculties are assigned during invigilator allotment [15]. The authors suggested automating the operation of the examination cell where students would not have to queue up to fill in the different forms and follow the procedures to gain access to hall tickets and different examination notices [16].

2.1 CLASSROOM TECHNOLOGIES

In developing countries, most of today's universities classrooms have (laptop) computers, smart boards and Internet facilities [17]. Although several research studies on the design of classroom technologies concentrate on promoting learning activities [18,19,20,21,22], only a few research explorations also concern the creation of experiences that require users to have limited attention resources (the teacher or the students). For example, Greiffenhagen [23] studied the work of teachers during collective learning exercises to find out how teachers participate in the learning of pupils. Prieto et al. [24] presented a study on the 'orchestration load' of teachers (the mental load needed to promote CSCL activities in daily work) using mobile eye-tracking technology in both a laboratory and a field environment, finding that the increased load for teachers may be difficult for CSCL practice to facilitate and control CSCL activities [24]. In 'proactive teaching,' which takes place before or after class while the teacher is alone, Yinger [25] has studied the routines of teachers. Different fields, such as School Administration, Artificial Intelligence, Mathematics or Operational Research [26], can assert the resolution of the timetable problems just called class routine or examination hall invigilation. Perhaps we need to focus on simulation techniques imported from fields as diverse as physics or biology to solve the problem [27]. In a given time period, an inspection takes place, using a set of rooms
And a set of watchmen [28].

2.2 TIMETABLE GENERATION ALGORITHMS

Constraint Based Methods: We may infer that the purpose of the above approach is to minimize the violation of soft constraints and to fulfill the difficult constraints [29].
Sequential Methods: In this approach, the problem of timetabling is treated as graph issues [29].
Cluster Methods: The group in which the problem is split into a number of events/groups is specified so that hard constraints and soft constraints are met [29].
Metaheuristic Methods: Stimulated Annealing (SA), Tabu Search (TS) and Local Search Algorithm (LSA) [29].

2.3 AUTO GENERATE SYSTEM BASED ON EXPERT SYSTEM

To obtain fast computational capabilities, we have used various optimization methods, such as Particle Swam Optimization (PSO), Genetic Algorithm (GA), Greedy Approach Algorithm (GAA), Tabu Search (TS), Ant Colony System (ACS), Fuzzy Logic (FL) and Stimulated Annealing (SA). The expert method is used by considering the ability to mimic the extraction and integration of data between expertise and human experts [30]. The primary issue in a series of events is the surveillance method or timetabling. Date, time, place, Id staff and subjects are an example of this issue. No individual or resources are reported at the same time and one or more than the location is expected for [31].

2.4 ALGORITHMS

We implemented the genetic algorithm in the Class Routine Allocation Management System. It uses biology-inspired techniques that involve selection, chromosomes, crossover, and mutation to solve a given issue [32]. The Genetic Algorithm operators are: population initialization [33], selection [34], crossover [35], and mutation [35]. The Unified Modeling Language (UML) proposed by the Object Management Group (OMG) in 1997 is considered to be the mainstream (OMG) language in 1997 and is considered to be the standard object-oriented research and design language [36]. In the Exam Hall Invigilation Management Scheme, on the other hand, we used greedy algorithms. All results are stored in the database so that they can be accessed, printed, edited or retrieved later by registered users [37].

3. METHODOLOGY

Methodology is a contextual framework for research, a coherent and logical scheme based on views, beliefs, and values that guides the choices researchers or other users. In a production method, some data and information need to be obtained from users in order to create a system. It is a very essential part of the Software Development Life Cycle (SDLC). The main aim of our system is to establish a timetable. In our project we follow the agile model.

3.1 DESIGN

One of the components of the Django web application is architecture. We use architecture to grasp the whole process quickly. We use both the front end and the back end in our system. In front-end design we use HTML, CSS and Java Script for building a user-friendly interface. To easily understand our process and easily find user requirements, we built a navigation bar. We use the Python programming language and Django web platform in the back-end portion for a user-friendly interface. We try to keep our design simple and easy to use.

3.2 ALGORITHMS

3.2.1 Genetic Algorithms:
The genetic algorithm is implemented by the operators to build the next generation out of the generation currently used: mutation, crossover and reproduction.

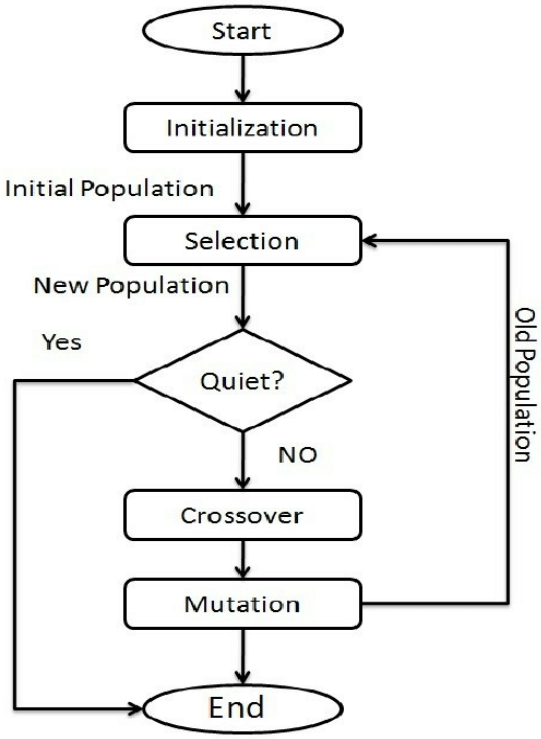

Figure 2: Genetic Algorithm Flowchart.

The Algorithm:

1. No schedule has more than one class at the same time.

$$\forall(i,j), i \neq j, \Delta\left(S_i \neq, S_{j,}\Delta\, TS_i \neq TS_j\,, where\ R_{i,} \neq R_{j,}\right)$$

$$\forall(i,j), i \neq j, \Delta\left(L_i \neq, L_{j,}\Delta\, TS_i \neq TS_j\right)$$

2. No teacher can teach more than one class at the same times.
3. No teacher can be in two classes as the same period.
4. Consider room availability and the number of the days, time slots, sessions, and register for class routine:

$$\forall i, class\ routine\left(S_i\right) \leq capacity\ (R_{i),}\ \ where\ class\ routine\ (y) \in i\ , y \in i, and\ capacity\ (y) \in i, y \in R)$$

3.2.2 Greedy Algorithm:

The Greedy algorithm is designed to solve a given problem optimally. Decisions are taken from the specified solution domain in the greedy algorithm method. The nearest solution that seems to have an optimal solution is selected as greedy. Greedy algorithms try to find an efficient, localized solution that can ultimately lead to globally optimized solutions. The algorithm step is with the following description:

Step 1: To determine the adequacy of teacher resources.

Step 2: Check each invigilator's largest number of invigilating, whether there is too large, if it is true, it will be amended automatically to the difference of the number of the exam

arrangement period permitted minus the number of examiner hours. At the same time, the total number of invigilators and the number of exam events under variety priority can be gained.

Step 3: From the row of test results list in order, if it has been completed by hand-ranked, then go to step8; if subscript overflow, indicating that exam arrangement task is completed, go to step 9.

Step 4: Get the necessary number of teachers according to the result.

Step 5: Start loop, until the num = 0, then go to step 8.

Step 6: Stating the lack of teacher resources provided by this priority, the arrange teachers whose time of be a invigilator has not yet reached its maximum in this examination task in this priority, write invigilator teacher's information, update the number of invigilating of this teachers and the set of exam arrangement times of examiner/ invigilator. However, these teachers may have the task of this test has been examiner or examiners exam period, or with the test task, some classes of the same department, so the conflict information will be added.

Step 7: While stating that the priority to provide adequate resources for teachers, then selected num teacher randomly in this precedence, check the conflict, randomly again according to the number of teachers in conflict, if still exists conflict, then keep the last results, write information of invigilators, update the number of invigilating of these teachers and the set of exam arrangement times of examiner/ invigilator, and add the conflict information.

Step 8: i + +, go to Step 3.

Step 9: Extract the first conflict information from clash, according to the following manner.

1) Selected a teacher randomly from exam arrangement when the following occurs:
a) Conflict with other teachers;
b) The teacher has no invigilation tasks;
c) The teacher has other examination or invigilation tasks in this time.
d) The relationship between the set of this teacher's examiner / invigilator test arrangement period and the set of conflict teacher's examiner / invigilator test period is the subset of the universe.
e) Although do not conform to previous, but the set of difference between the set of extracted teacher's examiner / invigilator test arrangement period and the set of conflict teacher's examiner / invigilator test period is this teacher's examination time.

2) Find the first invigilation period in the set of difference between the set of extracted teacher's examiner / invigilator test arrangement period and the set of conflict teacher's examiner / invigilator test period, and swap with the invigilation task in conflict teacher's post-conflict period, and update the information accordingly.

Step 10: Remove the first conflict information have been processed in Clash, if the Clash is not empty, go to step 9, otherwise end the algorithm and exit.

In step 7, the method of selecting teacher randomly on the priority level is relatively simple, use random function and get a random value first, and then calculate to get the number of extracted teacher's pk (pk $\in P$), as in

$$k = randnum + \sum_{m-1}^{j-1} (Level_m\_Teachers\_Count)$$

3.3 REQUIREMENTS

An important guideline for a project is requirements. Developing clear and complete specifications, particularly for an IT-related project, may mean the difference between success and failure.The criteria are the skills, strengths, and characteristics that must be included in the final project deliverable. Our mai requirements are: users, treachers, admin, hardware, software.

3.4 DIAGRAMS & SYSTEM OVERVIEW

We used here mainly three diagrams. These are: general block diagram, ER diagram, Class diagram, General block diagram.

General Block Diagram:

a. Collect and interpret information obtained from the Scheduling Planner.
b. To preserve data, a Django web framework database will be developed.
c. Draw potential diagrams for various scenarios. (Flow charts, diagrams for ER diagrams, Class diagrams).
d. Through running all the test steps, the system will test: black box testing, white box testing and software testing.

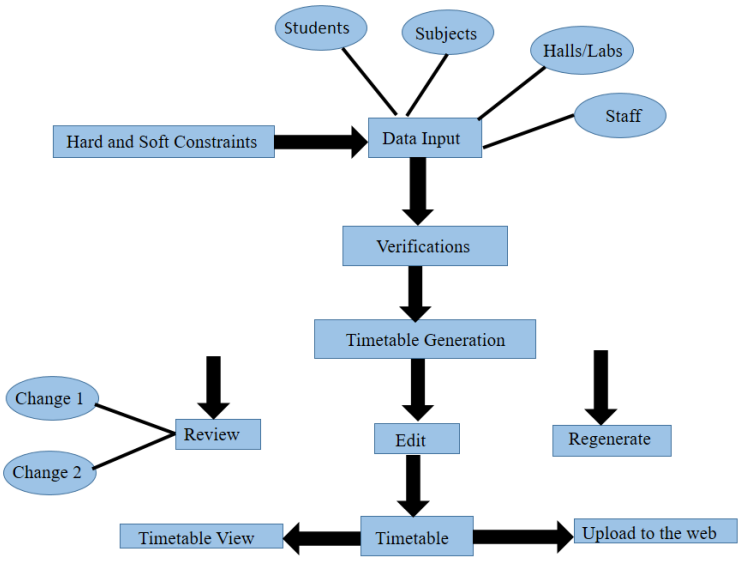

Figure 3: General Block Diagram.

Entity Relationship Diagram:

Three basic concepts are based on this model:

i. Entities
ii. Attributes
iii. Relationships

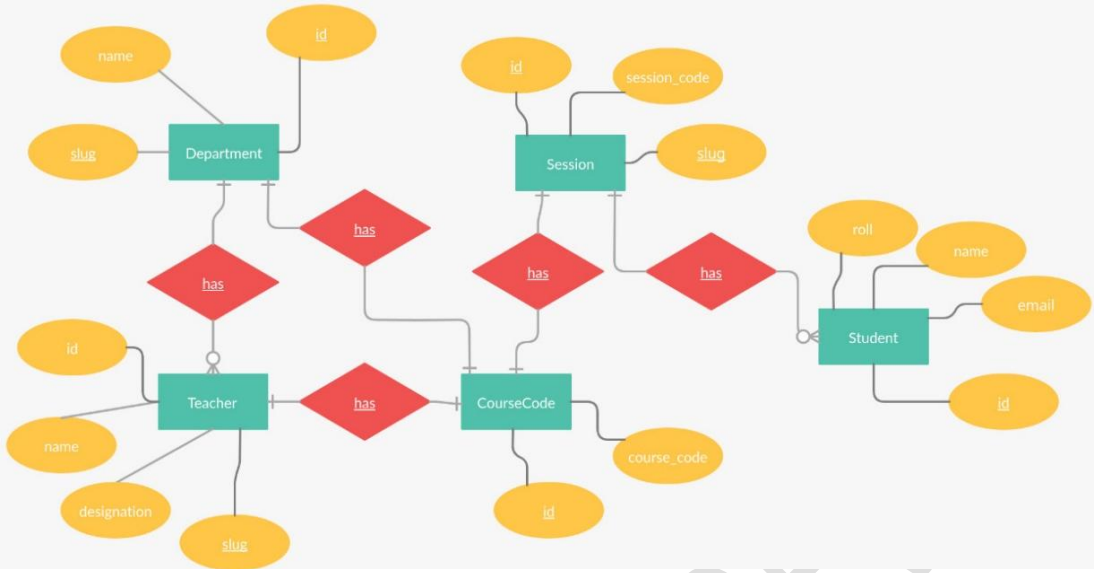

Figure 4 : ER diagram.

The location, person, object, event or concept that stores data in the database may be an entity. An attribute and a specific key must be present in the characteristics of entities. Each entity consists of certain 'attributes' representing that entity. In the following diagram, for example, some entities are: Department, Teacher, Course Code, Session, and Student. Attribute is either an entity types or a relation type single valued property. In this diagram, entities have some several attributes name, id, designation, session _code, email. Here are some geometric shapes in ER diagram. These are called diamond, rectangle, ellipse, lines.

Class Diagram:

A class diagram consisted of:

i. Class name
ii. A set of classes
iii. Attributes
iv. Operations
v. A set of relationships between classes

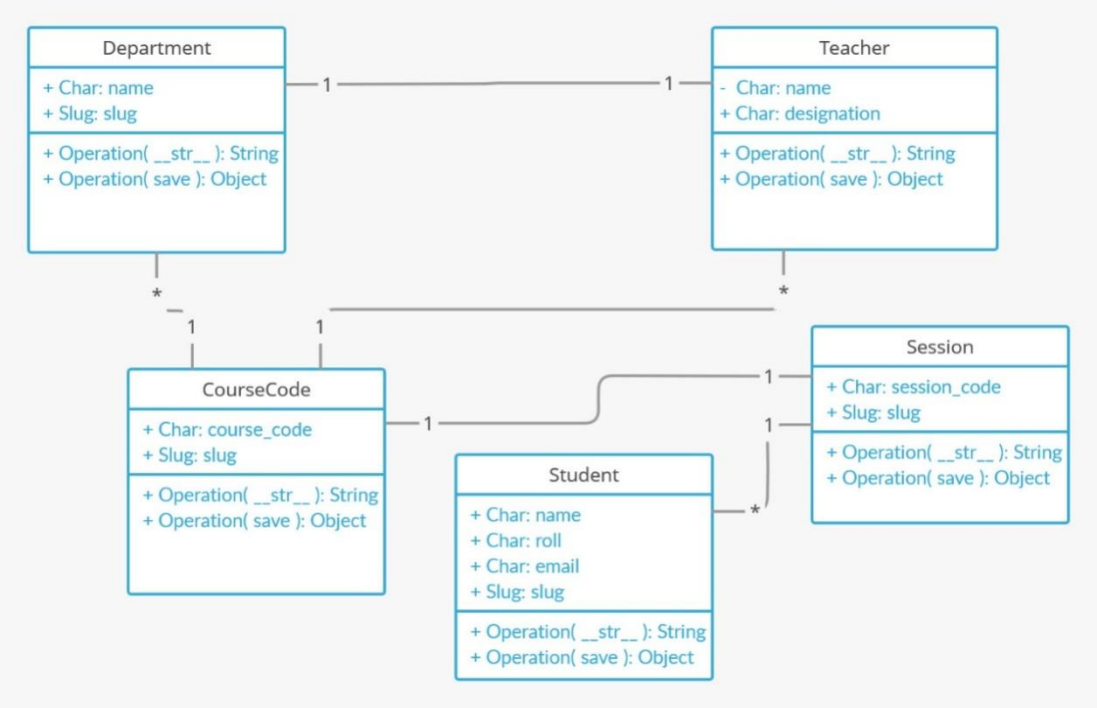

Figure 5 : Class Diagram.

A class is an object's blueprint that can share the same relationships, attributes, operations, & semantics. A class, including its name, attributes, and operations in separate compartments, is made as a rectangle. In our class diagram, there are some classes, these are, Department, Teacher, Course Code, Student, Session. An attribute is the name of a class property that defines the object being modeled. This component is located just beneath the name-compartment in the class diagram. Such as: name, designation, email, session code.

System Overview

The full scheduling scheme is shown here. The designed application is a web application and must be acceptable for all users who will be using the framework. Users are able to use a uniform platform to access the program. It is, in addition, easy to manage. It will be tailored to the workload and it is also possible to improve protection. Additionally, more features are easier to add. This model displays the system architecture of the schedule system using the Greedy Approach Algorithm and Genetic Algorithm. This model is built using the agile model.

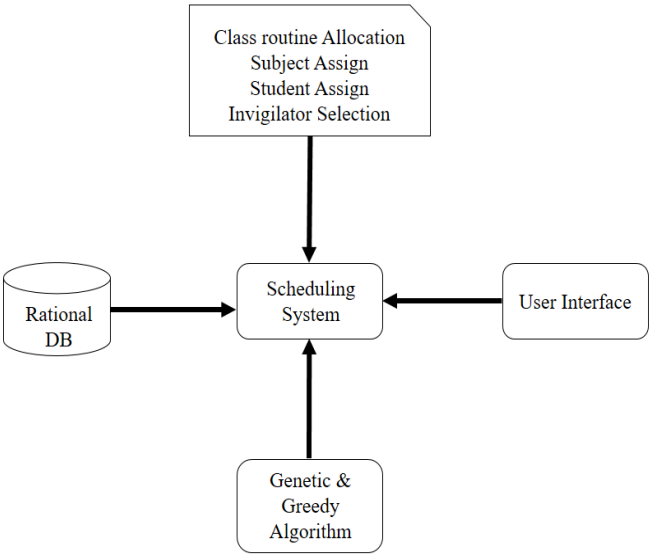

Figure 6 : System Architecture.

3.5 IMPLEMENTATION

We have to collect various types of software or application such as text editor to render the web program, such as: Sublime Text, a browser such as: Chrome, Firefox and used to install Python executing servers such as: Django. And it is just right to be installed in our source code management software.

4. TESTING AND MAINTENANCE

Testing and servicing is the study of software with user requirements and machine specifications. At the stage level in the life cycle of creating software or device level, testing is performed in the program code. In this chapter we discussed about various testing and our manual system for testing as test exercises.

4.1 TEST ARRANGE AND TEST EXERCISES

A better software tester by learning programming principles is discussed below:

A better understanding of the effect of code change: For black-box testers, test case design is a challenge. You need to define the collection of conditions for evaluating the program in a limited time, without understanding how the code is written. You should speak to developers and learn how the logic is applied if you have a clear understanding of programming. This will help you concentrate on the riskiest areas for your practical and regression studies.

An understanding of the boundaries and layers of the application: Program is built in numerous layers – trade layer, benefit layer, database layer, etc. Knowing how code layers connected with each other can assist you plan way better integration tests.

An awareness of the release process: Developers build branches, address bugs, and merge corrections to a master branch in software release flows. You may recognize what kind of problems can occur as a result of version control if you are familiar with this method.

The capacity to talk developer's dialect: Specialized dialect is the dialect engineer's talk, and knowing the wording can increment the quality of communication with designers.

Gain developers believe and pick up proficient notoriety: On the off chance that you talk developers' dialect, they will have more regard for you as a talented analyzer. This may open them up to share with you their concerns approximately the code, unsafe spots, and refactoring thoughts – something they might not have done already, considering you'd not get it sufficient.

Automating functional tests: Automating functional tests is a common use of coding for testers. Like Selenium Web Driver, which is the most common framework, most of the automation frameworks require you to write code. Writing test automation that is maintainable, stable, and accurate is not a simple job, as automation experts say. So, the stronger your programming abilities, the greater your chances of creating solid automation.

Handling errands that aren't viable to total physically: Separated from computerizing utilitarian scenarios, testing applications may moreover require dealing with different errands which are not down to earth or now and then not indeed conceivable to handle physically. There are a couple of examples here:

i. Generate data from tests.
ii. Read DB, Flat Files, or XML data.
iii. Log file parse.
iv. Extract and review data about results.
v. Configure the test environment.
vi. Monitor the status of the application.

This is our manual work procedure. Here we shown a complete class routine design with a full semester. We have considered five departments for exam hall invigilation management system to maintain our whole project. As a sample, below tables are given for test exercises:

Table 1: Manual Class Routine.

Day	Year, Term	9.00-10.15	10.20-11.35	11.40-12.55		1.40-2.55PM	3.00-4.00PM	4.00-5.00PM
Sunday	Y-4, T-1		ICE-4105 TZK 812	ICE-5117 MARK 812		ICE-4101 MARK 812		
	Y-3, T-1		ICE 3105 MMR 810	ICE-3109 SJS 810		ICE-3107 TZK 810		
	Y-2, T-1		ICE-2104 LAB (ZUS) 808			ICE-2106 LAB(NN) 808		
	Y-1, T-1		PHY-1103 MBH 809	ICE-1105 NN 809		ENG 1109 809	ICE-1101 MU 809	
Monday	Y-4, T-1	ICE-4104 LAB (SJS) 812	ICE-4107 ZUS 812			ICE-4103 SJS 812		
	Y-3, T-1	ICE-3104 LAB(AA +TZK) 813		MATH 3113 HMSA 812		ICE 3108 LAB AA+TZK 808		
	Y-2, T-1	ICE-2109 MBH 810	ICE-2101 AA 810	MATH 2113 SJ 810		ICE-2105 NN 810	ICE-2105 NN 810	
	Y-1, T-1	ICE-1101 MU 809	ICE-1105 NN 809	HUM-1105 MMIS 809		PHY 1103 TZK 809	ICE-1103 AA 809	
Tuesday	Y-4, T-1		ICE-4109 TZK 812	ICE-4105 AA 812		ICE-5117 ARK	ICE-4106 LAB(TZK+AA) 813	
	Y-3, T-1	ICE-3106 LAB (MMR+ NN) 808				ICE 3103 TZK 810	ICE-3109 SJS 810	ICE 3105 NN 810
	Y-2, T-1	ICE-2107 SJS 810	ICE-2103 ZUS 810	ICE-2109 MBH 810				
	Y-1, T-1	ICE-1103 MBH 809	MATH-1111 MMR 809	HUM-1105 DYS 809		BANGLA MRD 809		
Wednesday	Y-4, T-1		ICE-4101 MARK 812	ICE-4107 ZUS 812		ICE-5117 MARK 812		
	Y-3, T-1		ICE-3101 MU 810	ICE-3101 MMR 810		ICE-3107 AA 810		

BREAK

	Y-2, T-1		ICE-2107 SJS 809			ICE-2101 MBH 809	ICE-2110 LAB (MBH) 813	
				ICE-1104 LAB (MBH+AA) 813			ICE-1108 LAB MARK 808	
Thursday	T-4, T-1	ICE-4108 LAB (ZUS) 813	EEE-2103 MARK					
	Y-3, T-1	ICE-3102 LAB (MMR+ MU) 812	MATH 3113 [10.00-12.00] HMSA 812			ICE-3103		
	Y-2, T-1		MATH-2113 [11.00-1.00] SJ 810			ICE-2103 ZUS 810	ICE-2102 LAB (AA+MBH) 813	
	Y-1, T-1		MATH-1111 MMR 809	ENG-1109 809		BANGLA MRD 809	ICE-1102 LAB (MU) 808	

Table 2: Term Final Exam Routine.
Session: 2017-18 (Y-3, T-1)

2018-19 (Y-2, T-1)
2019-20 (Y-1, T-1)

Date	Course Code (10 AM-2 PM)
14.03.21	MATH-3113
15.03.21	ICE-1101
18.03.21	MATH-2113
21.03.21	ICE-3109, ICE-1105
23.03.21	ICE-2101
25.03.21	ICE-3107, ENG-1109
29.03.21	ICE-2109
31.03.21	ICE-1103, ICE-3105
05.04.21	ICE-2105
06.04.21	ICE-3103
07.04.21	MATH-1111
11.04.21	ICE-2103
13.04.21	PHY-1103, ICE-3101
15.04.21	ICE-2107
18.04.21	HUM-1105
22.04.21	BANG-1101

Table 3: Hall Invigilators List.
Dept.: ICE
Session: 2015-16
Term final Examination

Hall invigilators list

Date	Day	Invigilators List
13.12.2020	Sunday	Zayed-Us-Salehin, Sultana Jahan Soheli, Nishu Nath, Md. Bipul Hossain, Main Uddin.
20.12.2020	Sunday	Sultana Jahan Soheli, Apurba Adhikary, Tanvir Zaman Khan, Nishu Nath, Md. Bipul Hossain, Main Uddin,
27.12.2020	Sunday	Md. Ashikur Rahman Khan, Zayed-Us-Salehin, Sultana Jahan Soheli, Nishu Nath, Md. Bipul Hossain, Main Uddin.
03.01.2021	Sunday	Zayed-Us-Salehin, Sultana Jahan Soheli, Nishu Nath, Md. Bipul Hossain, Main Uddin.

13.12.2020	Sunday	Md. Ashikur Rahman Khan, Chief Invigilator
20.12.2020		

5. RESULTS & DISCUSSION

Web-based application is a secure method for schedule management system. Similar data and details have been checked. Some of the systems look interesting in the development of smart systems to be actually implemented. It is possible to further develop or merge existing systems, which helps to make the system more user-friendly, stable, and fast. For consumers, it is a less time-consuming and low-cost system that is very efficient. The screen that appears when the app opens is displayed. It is the one that is login screen in which the user has to log in to the Django site with his credentials. Originally only the admin can access the device.

5.1 FINAL OUTLOOK

We can select course codes, rooms, time slots, departments, sessions, teacher's Id and view the latter by clicking on the "Generate" button provided and see the expected routine and see the expected duty details. Via various kinds of device tests, we checked our system. All of the test results are good for our device testing, and the performance is right. The findings obtained in this study are summarized as follows: automation efficiency, cost-effectiveness, human error elimination and ease of manipulation. We may achieve a high degree of precision, but it takes time. Usage of the identification stage for the search result level categorization for our automated framework.

Generation: 28 / Fitness: 0.8506172839506173

sunday

Room	9:00	10:20	11:40	1:40	3:00	4:00
809	ICE-1105 [N.N]	BANGLA 1111 [M.R.D]	ICE-2105 [N.N]	BANGLA 1111 [M.R.D]	ICE-2107 [S.J.S]	
810	ICE 4109 [T.Z.K]		ENG-1109 [D.D]		ICE-4103 [S.J.S]	ICE-3109 [S.J.S]

monday

Room	9:00	10:20	11:40	1:40	3:00	4:00
809	ICE-2101 [M.B.H]			ICE-3105 [N.N]		MATH-2113 [S.J]
810	ICE-4107 [Z]	EEE-2103 [M.A.R.K]	ICE-4107 [Z]	PHY 1103 [T.Z.K]		ICE-4103 [S.J.S]

Figure 7: Automatic Class Routine System (1).

tuesday

Room	9:00	10:20	11:40	1:40	3:00	4:00
809	ICE-3107 [A.A]	ICE-1101 [M.U]	ICE-1105 [N.N]	ICE-3101 [M.M.R]	BANGLA 1111 [M.R.D]	
810	ICE-3109 [S.J.S]	ICE-2105 [N.N]	ICE-5117 [M.A.R.K]		ICE-4107 [Z]	

wednesday

Room	9:00	10:20	11:40	1:40	3:00	4:00
809	ICE-3105 [N.N]	ICE-2105 [N.N]	MATH 3113 [H.S.A]	ICE-2105 [N.N]	MATH 3113 [H.S.A]	MATH 3113 [H.S.A]
810	MATH-2113 [S.J]	ICE-2107 [S.J.S]	ICE-1105 [N.N]	PHY 1103 [T.Z.K]		EEE-2103 [M.A.R.K]

thursday

Room	9:00	10:20	11:40	1:40	3:00	4:00
809	ICE-5117 [M.A.R.K]	HUM-1105 [D.Y.S]			ICE-1103 [M.B.H]	
810	ICE-2107 [S.J.S]	ICE-3105 [N.N]	ICE-3107 [A.A]		EEE-2103 [M.A.R.K]	ICE-1103 [M.B.H]

Figure 8: Automatic Class Routine System (2).

Total

4-4-2021	Cheif Invigilator: 5 Invigilator: 8
8-4-2021	Cheif Invigilator: 5 Invigilator: 8
12-4-2021	Cheif Invigilator: 5 Invigilator: 9
18-4-2021	Cheif Invigilator: 5 Invigilator: 8
22-4-2021	Cheif Invigilator: 5 Invigilator: 6
26-4-2021	Cheif Invigilator: 5 Invigilator: 8
2-5-2021	Cheif Invigilator: 5 Invigilator: 8
6-5-2021	Cheif Invigilator: 5 Invigilator: 8
10-5-2021	Cheif Invigilator: 5 Invigilator: 8
16-5-2021	Cheif Invigilator: 5 Invigilator: 5
20-5-2021	Cheif Invigilator: 5 Invigilator: 6
24-5-2021	Cheif Invigilator: 5 Invigilator: 8
30-5-2021	Cheif Invigilator: 5 Invigilator: 8
3-6-2021	Cheif Invigilator: 5 Invigilator: 7
7-6-2021	Cheif Invigilator: 5 Invigilator: 6
13-6-2021	Cheif Invigilator: 5 Invigilator: 5

Figure 9: Counting Chief Invigilators and Invigilators.

Teacher Duty in Exam

Date	Day	Courses	Time	Chief Invigilator	Invigilator
4-4-2021	Sunday	[['ACCE 2101', 25], ['CSTE 2101', 25], ['FIMS 2101', 20], ['FTNS 2101', 20], ['ICE-2105', 25]]	2:00pm - 6:00pm	['Dr. Newaz Mohammed Bahadur', 'Dr. Md. Asadun Nabi', 'Professor Md. Jahangir Sarkar', 'Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan']	['Dr. Newaz Mohammed Bahadur', 'Dr. Mohammed Yusuf Miah', 'Dr. Humayun Kabir', 'Dr. Md. Asadun Nabi', 'Professor Md. Jahangir Sarkar', 'Md. Ruhul Kabir', 'Zayed-Us-Salehin', 'Sultana Jahan Soheli']
8-4-2021	Thursday	[['ACCE 3201', 25], ['CSTE 3201', 25], ['FIMS 3201', 19], ['FTNS 3201', 20], ['ICE-3109', 25]]	9:00am - 1:00pm	['Dr. Newaz Mohammed Bahadur', 'Dr. Md. Asadun Nabi', 'Professor Md. Jahangir Sarkar', 'Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan']	['Md. Saiful Alam', 'Juganta Kumar Roy', 'Md. Javed Hossain', 'Dr. Nahid Akter', 'Dr. Mohammad Belal Hossain', 'Md. Tazul Islam', 'Apurba Adhikary', 'Tanvir Zaman Khan']
12-4-2021	Monday	[['ICE-4105', 25], ['ICE-1105', 25], ['ACCE 2103', 25], ['CSTE 2103', 25], ['FIMS 2102', 20]]	2:00pm - 6:00pm	['Md. Ashikur Rahman Khan', 'Md. Ashikur Rahman Khan', 'Dr. Newaz Mohammed Bahadur', 'Dr. Md. Asadun Nabi', 'Professor Md. Jahangir Sarkar']	['Nishu Nath', 'Md. Bipul Hossain', 'Main Uddin', 'Debashismoy Dutta', 'Nahid Sultana', 'Sukanta Bhowmik', 'Abul Kalam Azad', 'Hasnat Riaz', 'Dr. Md. Anisuzzaman']

Figure 10: Automatic Exam Hall Invigilation System (1).

18-4-2021	Sunday	[['FTNS 2103', 20], ['ICE-2109', 25], ['ACCE 3203', 25], ['CSTE 3203', 25], ['FIMS 3203', 19]]	9:00am - 1:00pm	['Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan', 'Dr. Newaz Mohammed Bahadur', 'Dr. Md. Asadun Nabi', 'Professor Md. Jahangir Sarkar']	['Md. Abdullah Al Mamun', 'H.M. Shahadat Ali', 'Salma Jahan', 'Sadia Afroz', 'Sanchita Dewanjee', 'Ratnadip Kuri', 'A Q M Sala Uddin Pathan', 'Dr. Robiul Hasan']
22-4-2021	Thursday	[['FTNS 3203', 20], ['ICE-3105', 25], ['PHY 1103', 25], ['ACCE 2105', 25], ['CSTE 2105', 25]]	2:00pm - 6:00pm	['Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan', 'Md. Ashikur Rahman Khan', 'Dr. Newaz Mohammed Bahadur', 'Dr. Md. Asadun Nabi']	['Mohammad Rahanur Alam', 'Md. Muhaiminul Islam Selim', 'Dilruba Yesmin Smrity', 'Monju Rani Das', 'Dr. Mohammed Yusuf Miah', 'Dr. Md. Asadun Nabi']
26-4-2021	Monday	[['FIMS 2103', 20], ['ICE-4103', 25], ['FTNS 2105', 20], ['ICE-2107', 25], ['ACCE 3205', 25]]	9:00am - 1:00pm	['Professor Md. Jahangir Sarkar', 'Md. Ashikur Rahman Khan', 'Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan', 'Dr. Newaz Mohammed Bahadur']	['Mahabubur Rahman', 'Md. Masudur Rahman', 'Zayed-Us-Salehin', 'Tanjina Rahman', 'Sultana Jahan Soheli', 'Apurba Adhikary', 'Md. Saiful Alam', 'Juganta Kumar Roy']
2-5-2021	Sunday	[['CSTE 3205', 25], ['FIMS 3205', 19], ['FTNS 3205', 20], ['ICE-3101', 25], ['ICE-1103', 25]]	2:00pm - 6:00pm	['Dr. Md. Asadun Nabi', 'Professor Md. Jahangir Sarkar', 'Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan', 'Md. Ashikur Rahman Khan']	['Md. Javed Hossain', 'Dr. Nahid Akter', 'Dr. Shyamal Kumar Paul', 'Marjia Sultana', 'Tanvir Zaman Khan', 'Nishu Nath', 'Md. Bipul Hossain', 'Main Uddin']

Figure 11: Automatic Exam Hall Invigilation System (2).

This is our manual routine. If anyone needs to update the routine manually then, he or she can do it with manual system facility. As a sample below figures can be considered:

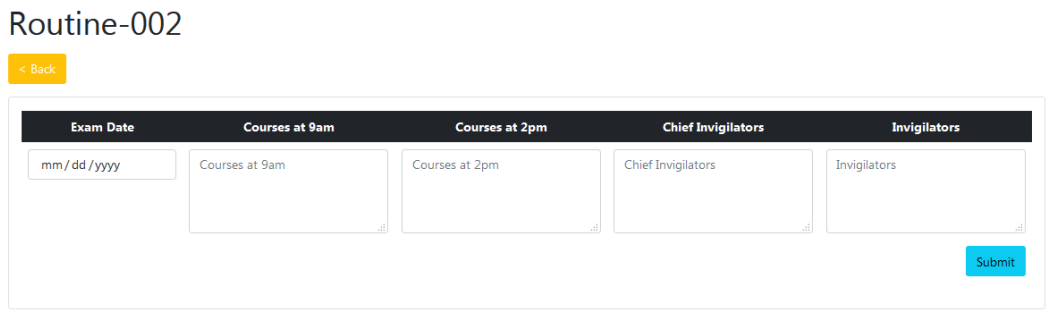

Figure 12: Creating Routine, Manual Exam Hall Invigilation System.

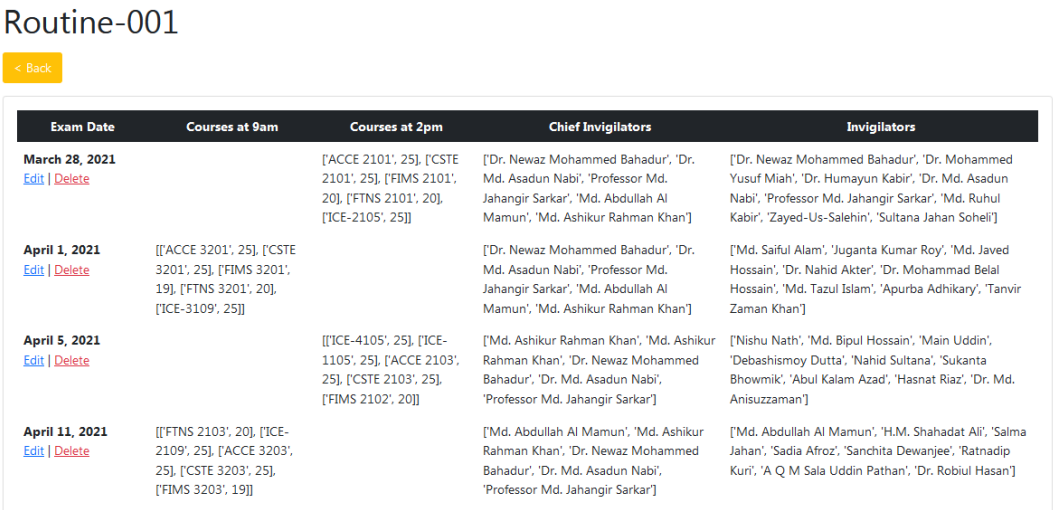

Figure 13: Manual Exam Hall Invigilation System (1).

April 15, 2021 Edit | Delete		[['FTNS 3203', 20], ['ICE-3105', 25], ['PHY 1103', 25], ['ACCE 2105', 25], ['CSTE 2105', 25]]	['Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan', 'Md. Ashikur Rahman Khan', 'Dr. Newaz Mohammed Bahadur', 'Dr. Md. Asadun Nabi']	['Mohammad Rahanur Alam', 'Md. Muhaiminul Islam Selim', 'Dilruba Yesmin Smrity', 'Monju Rani Das', 'Dr. Mohammed Yusuf Miah', 'Dr. Md. Asadun Nabi']
April 19, 2021 Edit | Delete	[['FIMS 2103', 20], ['ICE-4103', 25], ['FTNS 2105', 20], ['ICE-2107', 25], ['ACCE 3205', 25]]		['Professor Md. Jahangir Sarkar', 'Md. Ashikur Rahman Khan', 'Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan', 'Dr. Newaz Mohammed Bahadur']	['Mahabubur Rahman', 'Md. Masudur Rahman', 'Zayed-Us-Salehin', 'Tanjina Rahman', 'Sultana Jahan Soheli', 'Apurba Adhikary', 'Md. Saiful Alam', 'Juganta Kumar Roy']
April 25, 2021 Edit | Delete		[['CSTE 3205', 25], ['FIMS 3205', 19], ['FTNS 3205', 20], ['ICE-3101', 25], ['ICE-1103', 25]]	['Dr. Md. Asadun Nabi', 'Professor Md. Jahangir Sarkar', 'Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan', 'Md. Ashikur Rahman Khan']	['Md. Javed Hossain', 'Dr. Nahid Akter', 'Dr. Shyamal Kumar Paul', 'Marjia Sultana', 'Tanvir Zaman Khan', 'Nishu Nath', 'Md. Bipul Hossain', 'Main Uddin']
April 29, 2021 Edit | Delete	[['ACCE 2107', 25], ['CSTE 2107', 25], ['FIMS 2104', 20], ['FTNS 2107', 20], ['ICE-2101', 25]]		['Dr. Newaz Mohammed Bahadur', 'Dr. Md. Asadun Nabi', 'Professor Md. Jahangir Sarkar', 'Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan']	['Nahid Sultana', 'Sukanta Bhowmik', 'Abul Kalam Azad', 'Hasnat Riaz', 'Tasnim Sultana', 'Towhid Hasan', 'Debashismoy Dutta', 'H.M. Shahadat Ali']
May 3, 2021 Edit | Delete		[['ACCE 3207', 25], ['CSTE 3207', 25], ['ICE 4109', 25], ['FIMS 3207', 19], ['FTNS 3207', 20]]	['Dr. Newaz Mohammed Bahadur', 'Dr. Md. Asadun Nabi', 'Md. Ashikur Rahman Khan', 'Professor Md. Jahangir Sarkar', 'Md. Abdullah Al Mamun']	['Sadia Afroz', 'Sanchita Dewanjee', 'Ratnadip Kuri', 'A Q M Sala Uddin Pathan', 'Salma Jahan', 'Md. Muhaiminul Islam Selim', 'Smiriti Chakrabarty', 'Syeda Saima Alam']
May 9, 2021 Edit | Delete	[['ICE-3107', 25], ['MATH-1111', 25], ['FIMS 2105', 20], ['FTNS 2109', 20], ['MATH-2113', 25]]		['Md. Ashikur Rahman Khan', 'Md. Ashikur Rahman Khan', 'Professor Md. Jahangir Sarkar', 'Md. Abdullah Al Mamun', 'Md. Ashikur Rahman Khan']	['Dilruba Yesmin Smrity', 'Monju Rani Das', 'Md. Masudur Rahman', 'Zayed-Us-Salehin', 'Sultana Jahan Soheli']

Figure 14: Manual Exam Hall Invigilation System (2).

Above result ensures us a good output. We made a smart output for our project. We discussed about automatic class routine allocation system, both automatic and manual exam hall invigilation system. Above we have shown all the exact outputs.

6. CONCLUSION

A continuously guided automated schedule management system to create an automatic handle and load. All such information is stored in a centralized database that can be accessed whenever appropriate. Now, this program enables users to:

a. Distribution of classrooms for most courses.
b. To adjust a schedule based on complex circumstances.
c. To display the empty schedule for the examination hall surveillance system at any given timeframe.
d. Use the classroom effectively.

6.1 SCOPE FOR FUTURE DEVELOPMENTS

The Web application is a modern technology that enables everyone to access the Internet from computers or other devices. We are introducing this software and we intend to upgrade to additional functionality someday. In our university, there is a roadmap for our modern routine to incorporate it. And add more functionality to the real-life work of the student, as well. We're certainly converting it to Android users too. Some of the possible changes that can be achieved in future:

i. The routine management framework can be upgraded with the use of genetic algorithms to enable the allocation of laboratories for courses that require them.
ii. There will be an update that takes into account the personal preference and comfort of the respective faculty.

For few departments or divisions or parts of any university, the greedy algorithm will be employed in the exam hall invigilation management system. Therefore, in the future, by connecting to the whole University's invigilator allocation facility, this algorithm can be updated.

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