

A FRAMEWORK FOR INVIGILATION SCHEDULING

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Abstract

The process of allocating rooms to faculty during examinations are done manually which is time-consuming and involves a lot of effort. In the present scenario, all the information is stored in manual records which is difficult to modify, search or delete. The exam invigilation scheduling system is proposed to reduce the manual involvement and the amount of time taken to prepare the invigilation schedules. The proposed system presents a new automated process for invigilation system. The Examination department can capture biometric details of the faculty members, provide allocated room information. Faculty can view the details of their allocated room after the biometric verification. The software schedules faculty to the invigilation room based on the rules of the examination department. All the information will be stored in the database in a secure way. Using this system, it is easier to modify the faculty room allotment details. The invigilator's check-in and check-out for the room allocation using their thumb impressions. The in-time and out-time will be recorded before and after the examination. These details are stored and accessed by the head of the examination department. These details can be used to generate various reports. The main objective of the proposed system is analysis of invigilation duties. It provides the details of faculty members who are in invigilation duty and who are not. It also provides information about faculty on time and the faculty who is late. It provides information of the faculty members who requested for more substitutions. Using this system, the examination department can easily issue the remuneration to staff on the last day of examinations.

Keywords: invigilation scheduling, fingerprint, biometric verification, etc.

1. Introduction

Preparing the examination invigilation schedule has always been in itself a challenging task as the examination department has to take into consideration numerous factors and lecturers' constraints such as getting the invigilation schedules ready within a limited time frame, ensuring the invigilation duties assigned to the lecturers do not disrupt their marking and that the lecturers do not invigilate their own subjects. As the invigilation duties were assigned randomly there was a lot of mutual swapping amongst the lecturers resulting in confusion, misunderstandings, and complaints on uneven duty distribution. Thus, when the present invigilation scheduling committee took over the task of invigilation scheduling in 2004, they saw the need for a systematic and yet innovative approach to producing invigilation schedules that could minimize errors and simultaneously allowed lecturers to request for their preferred invigilation dates and time.

The system worked well but eventually with the increasing amount of data, provided by papers coupled with their preferred invigilation dates, the committee which had the growing population of lecturers, on the time and dates of their examination been manually transferring data into the computer realised an urgent need for a computer-aided system that could minimise manual involvement and processing time in data handling. To replace the manual system, we proposed "A Framework for Invigilation Scheduling". The software which schedules faculty to the invigilation room based on the rules of the examination department. All the information will be stored in the database in a secure way. Using this system, it is easier to modify the allotment details. The invigilator's check-in and check-out using their thumb impressions and get their corresponding room allotment details. The in-time and out-time will be recorded before and after the examination. These details are stored and can be used to generate various reports. The system is expected to increase the efficiency in allocating the rooms to the faculty members who are going to invigilate during the examination. Therefore, it will decrease the required work hours and manpower.

2. Literature Survey

S. Priya Dharshini, M. Selva Sudha from the Department of computer science engineering has proposed the system termed as “Exam Cell Automation System” [1]. The papers main objective is to simplify the allocation of halls in the institute and allows the students to access the examination information of their respective department. The information is stored in alphabetical order which is provided by the faculty and the exam coordinator of their respective department. The admin updates the information about student details, exam timing, hall details and available space in the hall. Now the automated system will generate the seating order to the students which are provided by department staff in the form of a spreadsheet. The admin will enter the information about the student’s marks into their spreadsheets directly by GUI or by the database entry.

Identifying individuals based on their distinctive anatomical such as fingerprint, face, iris, hand geometry and behavioural such as signature, voice characteristics is called biometrics (Anil and Ajay; Katiran, Wahab and Rahman). Fingerprint identification is one of the most well-known and publicized biometrics. This is because of their uniqueness and consistency over time, fingerprints have been used for identification for over a century, more recently becoming automated (Josphineleela and Ramakrishnan) due to advancements in computing capabilities. Fingerprint identification is popular because of the inherent ease in the acquisition, the numerous sources (ten fingers) available for collection, and their established use and collections by law enforcement and immigration (Nalini and Ruud). Biometric identifiers cannot be shared or misplaced; they intrinsically represent an individual’s identity and it is quickly becoming an essential component of effective identification solutions (Rao and Satoa). Recognition of a person by their body, then linking that body to an externally established “identity”, forms a powerful authentication tool. (Springer: New York). [4],[5],[6],[7],[8]

ISS. Burke et al’s findings further reveal that automated timetabling packages are capable of reducing greatly the time spent on preparing examination schedules [10]. This is supported by Junginger who discovers that using automated systems to prepare school timetables can save as much as 75 per cent of the time taken to plan the timetable using other non-automated systems. Twenty-nine per cent of the universities surveyed by Burke et al agrees that the task of scheduling invigilators is a major problem. However, he adds that some universities have examination schedules that are so well-planned that they can be reused with “only a small alteration”. Burke stresses that the quality of any schedule lies in its “usability and requirements of those who are subject to it” This type of system has to be flexible enough to successfully create schedules that not only allow room for any minor changes to be made to the master schedule but have also considered all the various constraints.

Ong, Liew, and Sim developed an invigilation scheduling system concentrating on optimizing lecturer preferences (i.e. invigilation dates, time and constraints) for UiTM Sarawak (Samarahan Campus). [13] The invigilation scheduling only involves lecturers Previously the schedule was prepared manually by the institution's invigilation scheduling committee. They randomly assigned invigilation duties and, later, there was a lot of swapping amongst the lecturers. This resulted in confusion, misunderstanding, and complaints of uneven invigilation duty distribution. This motivated them to develop an invigilation system with the aim of optimizing lecturer preferences. The system enables lecturers to view the examination timetable, choose their preferred invigilation timeslots, specify the examination date and the time of their own subjects; and view their individual schedule and the final invigilation timetable. Reis and Oliveira experimented with an examination timetabling problem from the University Fernando Pessoa, Porto using constraint logic programming.

Hishammuddin et al., there are various methodologies on examination scheduling which include constraint programming, graph colouring and metaheuristic approaches such as genetic algorithms, tab search, simulated annealing, the great deluge algorithm, and hybridized methods. Since the introduction of the fuzzy methodologies into the scene of scheduling, it has experienced much success especially in maintenance scheduling (Dahal, Aldridge and McDonald,), manpower allocation, aircrew rostering (Teodorovic et al.), and driver scheduling (Li and Kwan,). Hishammuddin and his team of researchers further investigate a fuzzy expert system that is used simultaneously with the multiple ordering criteria in trying to give a better representation of the challenges encountered in examination scheduling. Their study led them to discover that the “exploration of different methodologies to achieve multi-criteria orderings may be beneficial”(Hishammuddin et al.,). Burke et al., reiterate that various types of constraints which cannot be made possible using a single objective function can be handled by the multi-criteria approach. The system in this paper utilizes multi-criteria modelling. [14],[15],[16],[18],[19]

3. Existing System

In the present scenario, the task of invigilation scheduling involves all the lecturing staff who follows a set of invigilation schedule that is prepared manually by the examination department in the college. However, a lot of tasks are required in order to organize an examination from the college such as assigning a set of proctors to each examination room and assigning a seating layout for each examination room. These tasks usually involve a lot of data from many sources and require more time.

4. Proposed System

To replace the current paper records, we proposed “A Framework for Invigilation Scheduling”. The invigilators can access their assigned details about invigilation in a secure manner. The system utilizes user authentication, displaying only information necessary for individual duties. Additionally, each subsystem has authentication allowing authorized users to create or update information in that subsystem. All data is thoroughly reviewed and validated on the server before actual record alteration occurs. All data is stored securely on servers managed by the examination department and ensures the highest possible level of security. The system is expected to increase the efficiency in the allocation rooms to the faculty members who are going to invigilate during the examination. Therefore, it will decrease the work hours and manpower.

4.1 Objectives of the proposed system

- To make of Substitute Invigilation easier to manage.
- To reduce redundancy in allocation of invigilation rooms.
- To generate analytical reports based on data stored.
- To minimize manpower required
- To enable easier provision of remuneration to invigilators based on data during examinations

5. Algorithm

Step 1 - Accept the biometric data i.e., the fingerprint from the invigilator.

Step 2 - Verify and match the fingerprint.

Step 3 - Once the fingerprint is verified, the corresponding invigilator is then assigned a room based on the rooms available for invigilation. If the fingerprint is not matched with the Invigilator, error is displayed.

Step 4 - If error message is generated then stop, else check-in the invigilator.

Step 5 - Save the in-time of the invigilator.

Step 6 - Stop.

6. Implementation

The proposed framework has 4 modules handling different functionalities.

6.1 Manage Faculty: In this module, the examination department can add new faculty members and it can view the full details of the faculty like rating, designation, date of joining. They can edit and delete the details of faculty members.

6.2 Manage Examinations: In this module, they can upload the examination timetable. In this we have submodules. They are:

6.2.1 Exams: In the module, they can upload when the exam is (like date, exam name) and for whom (like branch and year). They can import from other files.

6.2.2 Seating: they can view the allotted rooms and divisions are made to each branch. It can also import.

6.2.3 Faculty: It can give the details about the assigned faculty for invigilation. It can view the available and required faculty for the exam to invigilate.

6.2.4 Invigilator duty: It can give a summary of the invigilator about invigilation along with check-in and checkout.

6.3 Manage Rooms: In this module, they are upload available rooms, room capacity, max divisions, and division capacity.

6.4 Reports: In this module, several reports can be generated based on the data stored.

7. Result

7.1 Invigilation Duty-Check in

The below figure1, shows the assigned room for an invigilator and check-in time is noted.

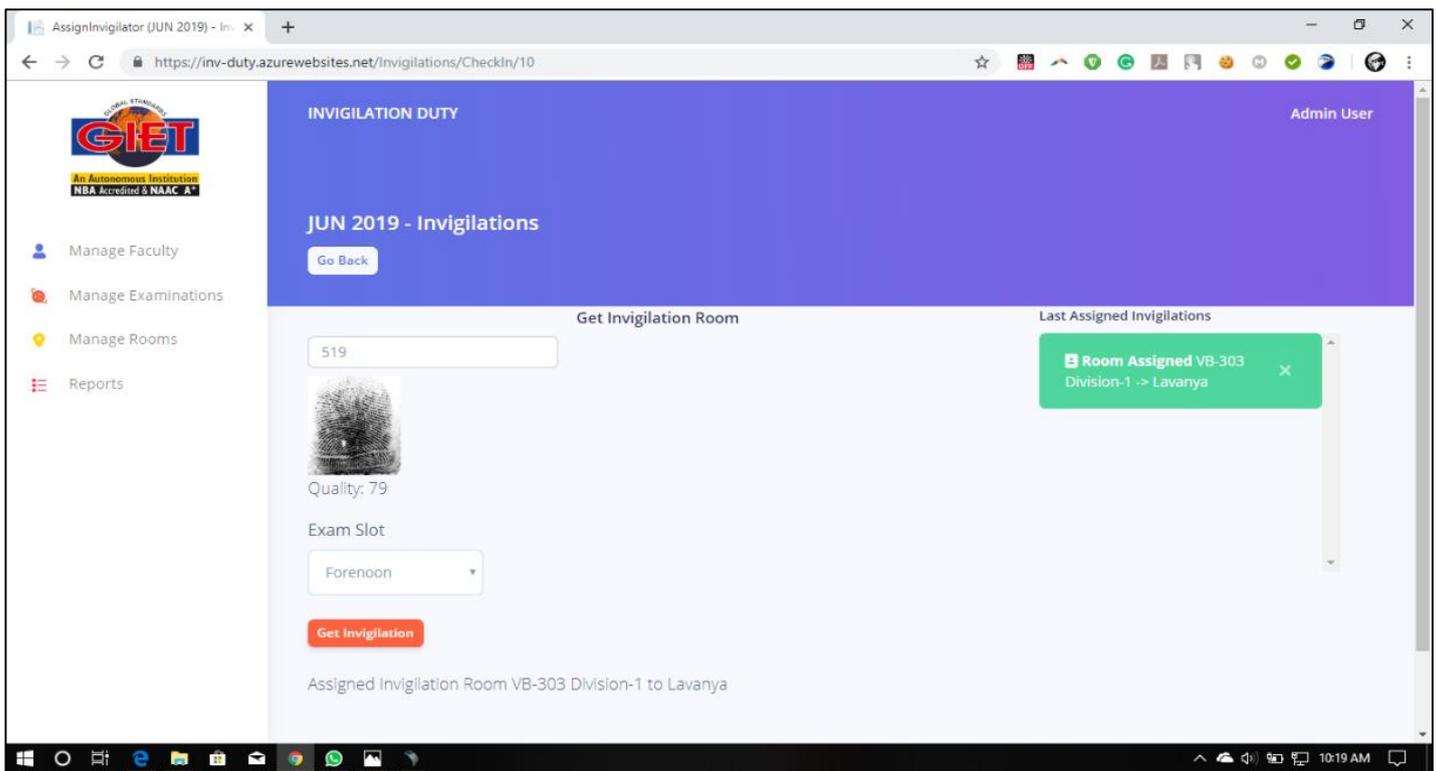


Figure 1. Invigilation duty check-in

7.2 Required Faculty Report

The below figure 2, shows the faculty report which is generated based on the available faculty information from the faculty page and it shows available faculty members on the day of the examination.

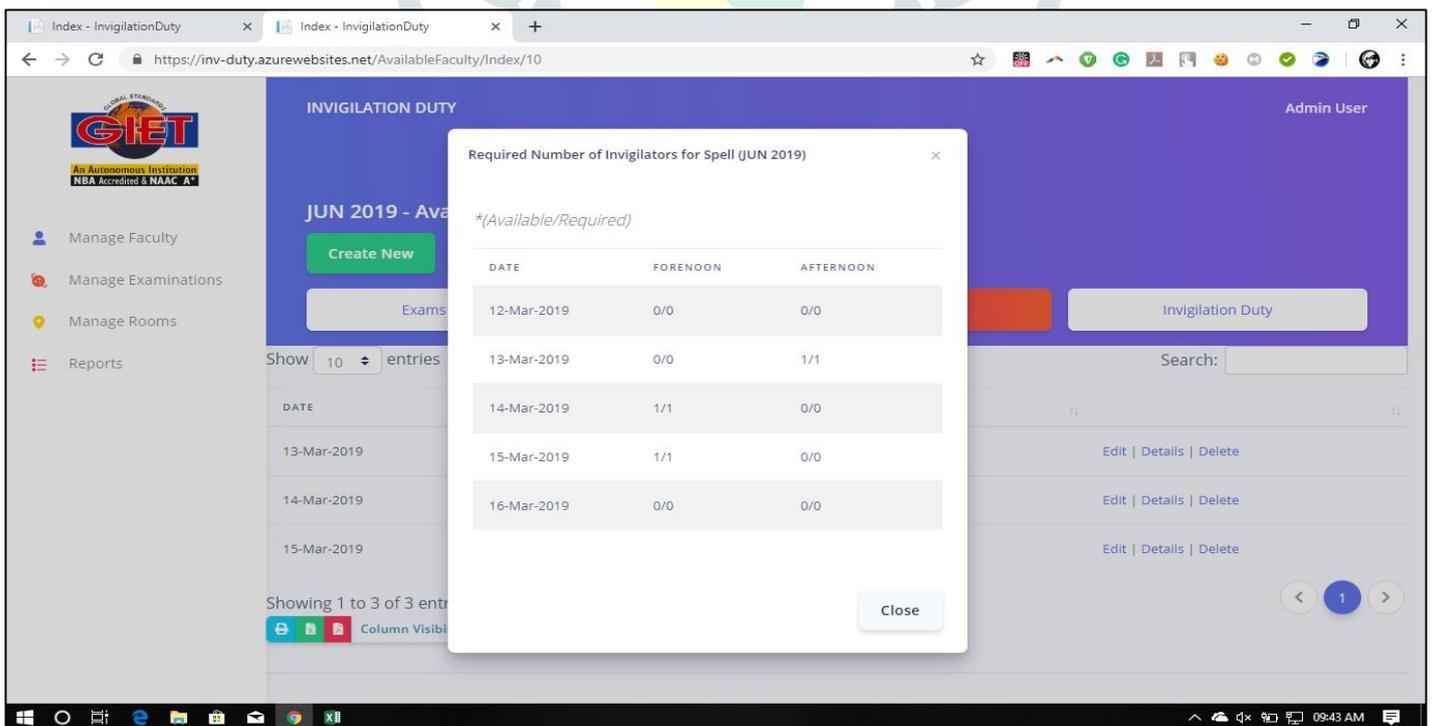


Figure 2. Required faculty report

7.3 Attendance

The below figure 3, illustrates the attendance of the invigilator based on the details of exam spell, branch, and date of the invigilation.

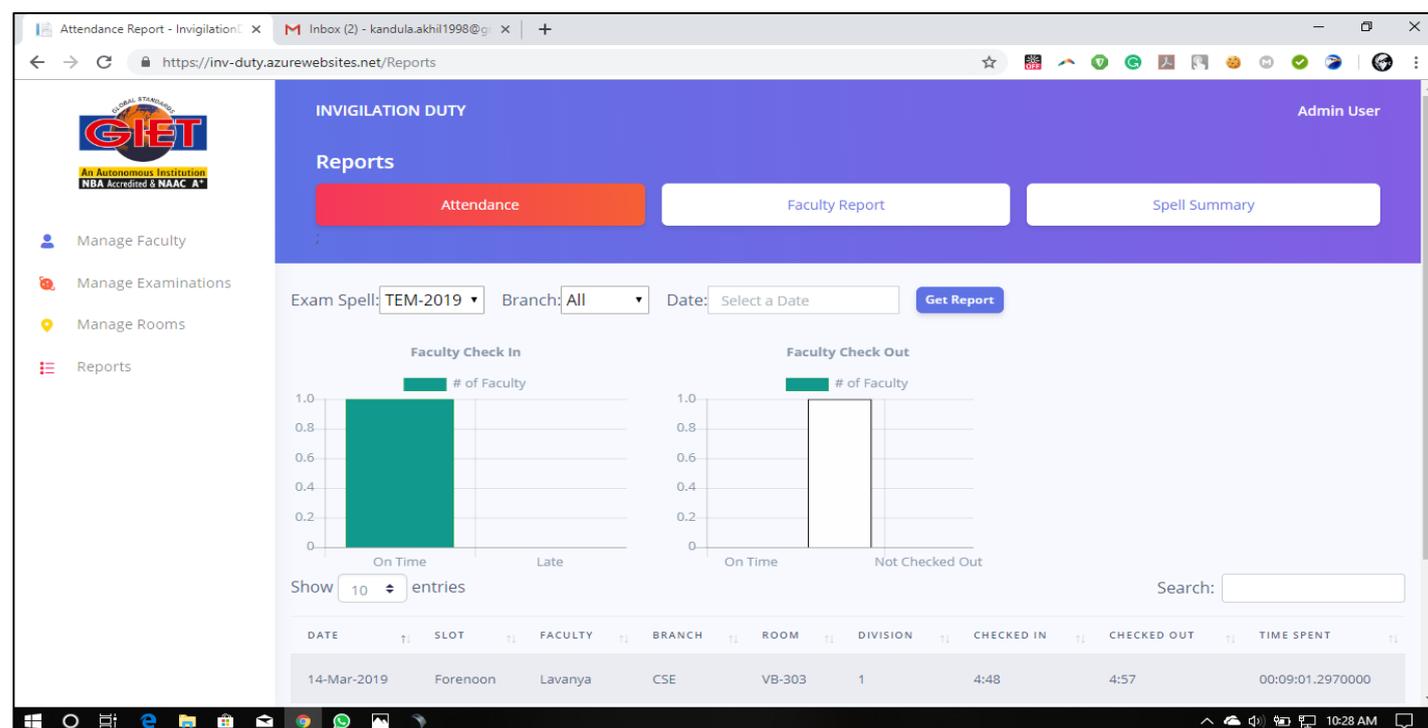


Figure 3. Invigilator Attendance report

8. Conclusion and Future Scope

The existing invigilator allotment system in the universities and colleges under consideration have few problems like time and manpower needed for checking the availability of invigilator and generating the report. Besides, it is always impossible to reach the optimum assignment by solving the problem manually.

This framework assists in automating the existing manual system. This is a paperless work. It can be monitored and controlled remotely. It reduces the manpower required. It always provides accurate information. Malpractice can be reduced. The data which is stored in the repository helps in taking intelligent decisions by the exam department and principal.

The proposed system can be extended making use of containerization technology to increase scalability and reliability. The proposed system can be improved and modified to support the automated seating allotment. With the help of cloud computing, the proposed system may be extended to improve portability thus handling multiple organizations at once.

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