Automatic Time Table Generator

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Abstract— The manual system of preparing time table in colleges with large number of students is very time consuming and usually ends up with various classes clashing either at same room or with same teachers having more than one class at a time. to overcome all these problems , propose to make an automated system. The system will take various inputs like details of students, subjects and class rooms and teachers available, depending upon these inputs it will generate a possible time tabble, making optimal utilization of all resources in a way that will best suit any of constraints or college rules. List of subjects may include electives as well as core subjects.

Keywords— Genetic algorithm, Timetable, Constraints, Chromosomes, Scheduling

I. INTRODUCTION

Even though most college administrative work has been computerized, the lecture timetable scheduling is still mostly done manually due to its inherent difficulties. The manual lecture timetable scheduling demands considerable time and efforts. The lecture-timetable scheduling is a Constraint satisfaction problem in which we find a solution that satisfies the

given set of constraints.

Automatic Timetable Generator is a JavaFx based software used to generate timetable automatically. Currently timetable is managed manually. It will help to manage all the periods automatically. It Maximum and minimum work load for a Faculty for a day and week will be specified for the efficient generation of timetable.

Timetable Scheduler targets to develop software for college in order to handle the 'Timetable Formation' for the staff. The head of every Department has problem in delegating work to their subordinates and response for the work position.

This work resolves the problem by permitting the lectures to see their assigned subject and timetable. This software helps to handle the particulars of the timetable of staff. JavaFx is employed as front end which is used to craft the user interface. MySQL is employed as back end and used to craft the database and save the particulars. Anybody with a little computer knowledge can approach and deal with the software with ease; hence it can be termed user friendly. Hence it offers security to the users by offering perfect login.

The process of preparing a timetable involves beneficial employment of resources which needs to be confronted each year by every educational institute. Most colleges have a number of different courses and each course has a number of subjects. Now there are limited faculties, each faculty teaching more than one subjects. So now the time table needed to schedule the faculty at provided time slots in such a way that their timings do not overlap and the time table schedule makes best use of all faculty subject demands. This object comprises of Classroom objects and the timetable for every it likewise a fitness score for the timetable. Fitness score relates to the quantity of crashes the timetable has regarding alternate calendars for different classes.

Classroom object comprises of week objects. Week objects comprise of days, comprises of timeslots. Timeslot has an address in which a subject, student gathering going to the address and educator showing the subject is related.

1.1 Existing and Proposed system:

Normally timetable generation done manually. As we know all Institutions or organizations have its own timetable, managing and maintaining these will not be difficult. Considering workload with this scheduling will make it more complex. As mentioned, when Timetable generation is being done, it should consider the maximum and minimum workload that is in a college. In those cases, timetable generation will become more complex. Also, it is a time consuming process. Automatic Timetable manger is a Java based software used to generate timetable automatically. Will help you to manage all the periods automatically. Proposed system will help to generate it automatically also helps to save time. There is no need for Faculty to worry about their period details and maximum workload. It is a comprehensive timetable management solution for Colleges which helps to overcome the challenges in current system.

1.2 Scope of Project:

Timetable Generation System generates timetable for each class and teacher, in keeping with the availability calendar of teachers, availability and capacity of physical resources (such as classrooms, laboratories and computer

room) and rules applicable at different classes, semesters, teachers and subjects level. Best of all, this Timetable Generation System tremendously improves resource utilization and optimization.

1.3 Salient features of the system
- Automatic Timetable manger is a Java based software used to generate timetable automatically.
- Proposed system will help to generate it automatically also helps save the time.
- There is no need for Faculty to worry about their timetable.
- It is a comprehensive timetable management solution for Colleges which help to overcome the challenges in current system.

II. LITERATURE SURVEY

There exist various problems such as Sports Timetabling,Examination Timetabling, Employee Timetabling and university timetabling. Carter and Laporte (1998) considered different categories to solve the timetabling problem. They are – Cluster method, Sequential method, Meta-Heuristics and Constraint Based method. Meta Heuristics is a higher level procedure which is used to provide good enough solutions for optimization problems. On some class of problems, they do not guarantee a globally optimum solution. This method is used when the classical methods are too slow or fail to give a solution. This is achieved at the cost of optimality and precision for speed. In this paper we consider the following Meta-Heuristic methods.

Genetic Algorithms (GA) was invented by John Holland and has described this idea in his book "Adaptation in natural and artificial systems" in the year 1975 . Genetic Algorithms are inspired by Darwin's evolutionary theory. GA comes under the class of Evolutionary algorithms that use the principle of natural selection to derive a set of solutions towards the optimal solution. It is a search heuristic which generates solutions to optimization problems using techniques inspired by natural evolution like mutation, inheritance, crossover and selection. Here the algorithm is generally started with a set of candidate solutions called the population. Each solution in the initial population has a set of characteristics (its chromosomes or genotypes) which can be altered and mutated. Solutions from one population are taken and used to make another population, with a hope that the new population will be better than the old one . Solutions are selected for breeding on the basis of their fitness. The fitness function usually identifies the number of constraints violated by a timetable. A timetable is said to be more fit if it violates less number of constraints. In the timetable generation problem, the population is a set of timetables maintained in memory. Each timetable is evaluated by finding the number of times it violates the constraints. Each timetable has an equal chance to participate in breeding. Bhaduri A evolutionary technique have been used to solve the time table scheduling problem. Methodologies like Genetic Algorithms (GAs), Evolutionary Algorithms (EAs) etc have been used with mixed success. In this paper, we have reviewed the problem of educational time table scheduling and solving it with genetic algorithm. We have further solved the problem with a mimetic hybrid algorithm, genetic artificial immune network (GAIN) and compare the result with that obtained from GA. Results show that GAIN is able to reach the optimal feasible solution faster than that of GA.

To Finding a feasible lecture/tutorial timetable in a large university department is a challenging problem faced continually in educational establishments. This paper presents an evolutionary algorithm (EA) based approach to solving a heavily constrained university timetabling problem. The approach uses a problem-specific

chromosome representation. Heuristics and context-based reasoning have been used for obtaining feasible timetables in a reasonable computing time. An intelligent adaptive mutation scheme has been employed for speeding up the convergence. The comprehensive course timetabling system presented in this paper has been validated, tested and discussed using real world data from a large university.

III. PROPOSED SYSTEM

The final system should able to generate time tables in completely automated way which will save a lot of time and effort of an institute administration. To make a timetable system generic so that I can work equally well for different School, Colleges and Universities. User defined constraints handling. Ease of use for user of system so that he/she can make automatic time table. Focus on optimization of resources i.e. teachers, labs and rooms etc. Provide a facility for everyone to view timetable. Generate multiple useful views from time table.Outcomes depends on

A. Interface for input
The system will be having an easy to use and interactive interface to enter all the inputs like the teacher name, the data for the rooms and data for the labs and the data for subject.

B. Database Capabilities
The system will have well designed database to store all the information which will be entered in as the input. Separate database maintaining basic information, subjects, teachers, batches and their associations and other details Database for holding generated timetable and for storing required timetables.

C. Processing Capabilities
The system will have algorithms to process all the data present in the database and keeping in view the various constraints like that a teacher should not have two consecutive lectures/labs, students have minimum one hour gaps,

proper rooms are allocated for the lectures and tutorials, labs are used optimally so that they are used for the maximum possible time, it will generate the time table.

D. System Architecture
Further to the study of data flow in timetable production, we are able to propose architecture for implementing the system.

1. Architecture for Timetable Production
Abstractly speaking, software architecture describes the elements of a system. It also shows the interactions between these elements, the models governing its composition and the constraints of these models. Generally, when facing a complex problem, the best approach is to break it down into parts that become easier to solve with simple solutions. Then, when we combine all these small solutions, we can find the solution to our complex problem.

2. Flow Chart of Time Table Scheduling Process
A flowchart is a type of diagram that represents an algorithm, workflow or process, showing the steps as boxes of various kinds, and their order by connecting them with arrows. This diagrammatic representation illustrates a solution model to a given problem as in Fig.1
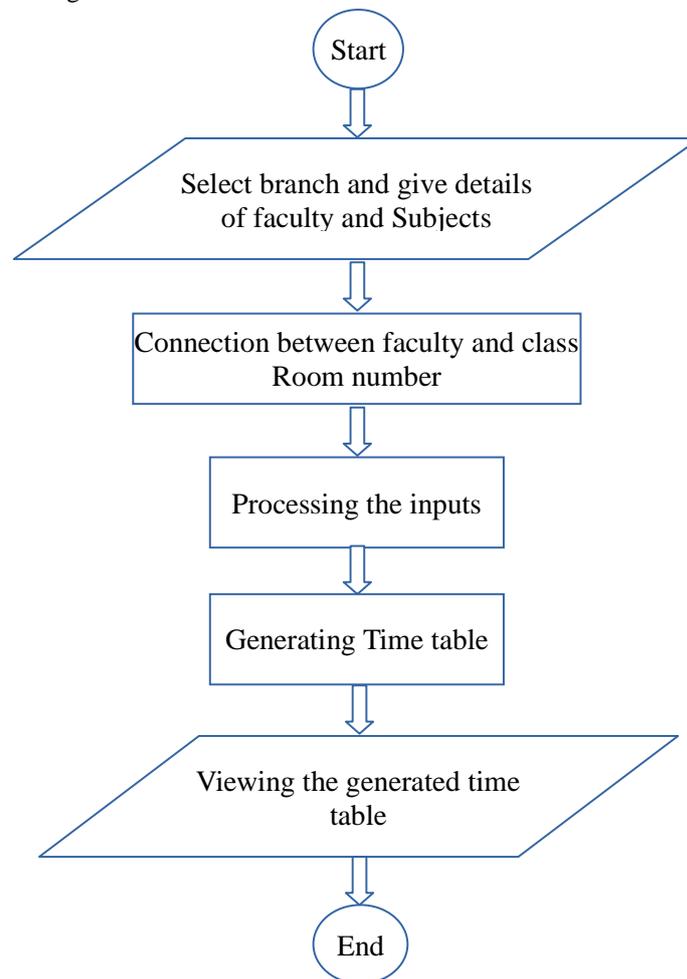

Fig. 1 A Timetable Generation Flow Diagram

IV. IMPLEMENTATION

A. Modules
It has developed in three modules
☐ Insertion Module
☐ Allocation module
☐ Display module

1) Insertion Module
In this module we provide various user inputs to our system which acts raw data for creating the final time table Fig. 2
☐Faculty Details
In this sub module we insert various details of faculty such as faculty name, email and contact number. And we also provide a unique faculty id which helps in referencing throughout our software and it also acts a login credentials.
☐Subject Details
In this sub module we insert details of subjects that are in our curriculum such and subject name. We try to store the theory subjects and lab subjects separately in our database so that it becomes easy for us in future use.

☐Mapping

In this sub module we take user input such as which faculty is taking which theory subjects and which lab in a particular semester and we store it our database.
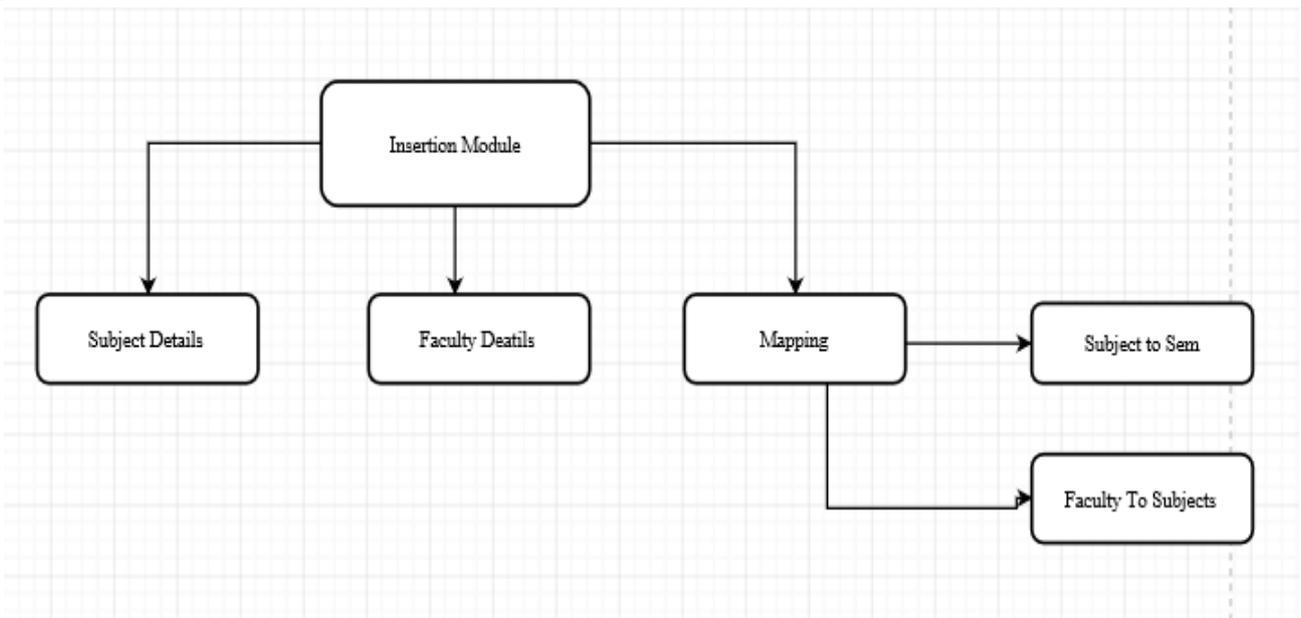

Fig. 2 Insertion Module diagram for Time table scheduler

2) Allocation Module.

In this module, user can choose any semester randomly to start the process. He starts filling the slots from the Monday by selecting the particular subjects, faculty that is mapped with that subject gets allotted to that slot of the day. The various soft and hard constraints are checked every time the slot is filled. It will not be blocked if any of the constraints is not satisfying.We are checking all these constraints by writing query in stored procedure and using the database data.Fig. 3
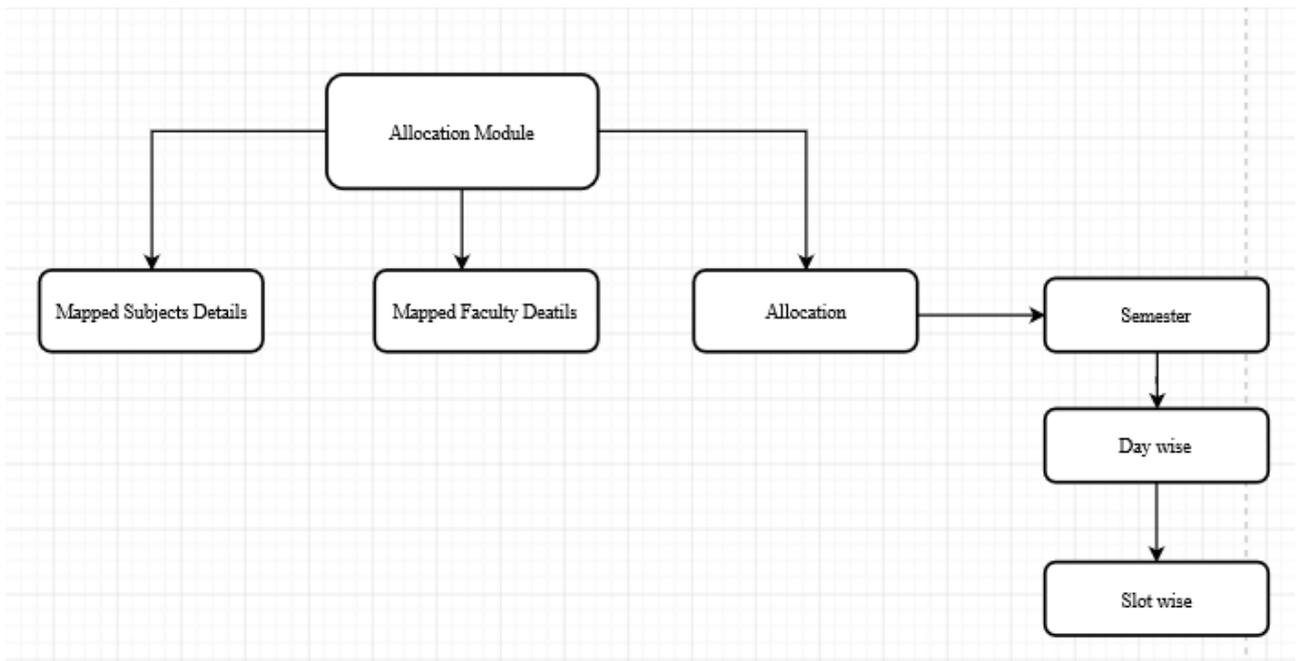

Fig. 3 Allocation Module diagram for Time table scheduler

3) Display Module

In this module we can view how the time table is generated of each class. We have also provided the feature to view the class time table and faculty wise time table Fig 4

☐Class Wise Time Table

In this we can view the class wise generated time table by selecting the particular semester which we want to see. The time table will have subject with faculty who handling that subject.

☐Faculty Wise Time Table
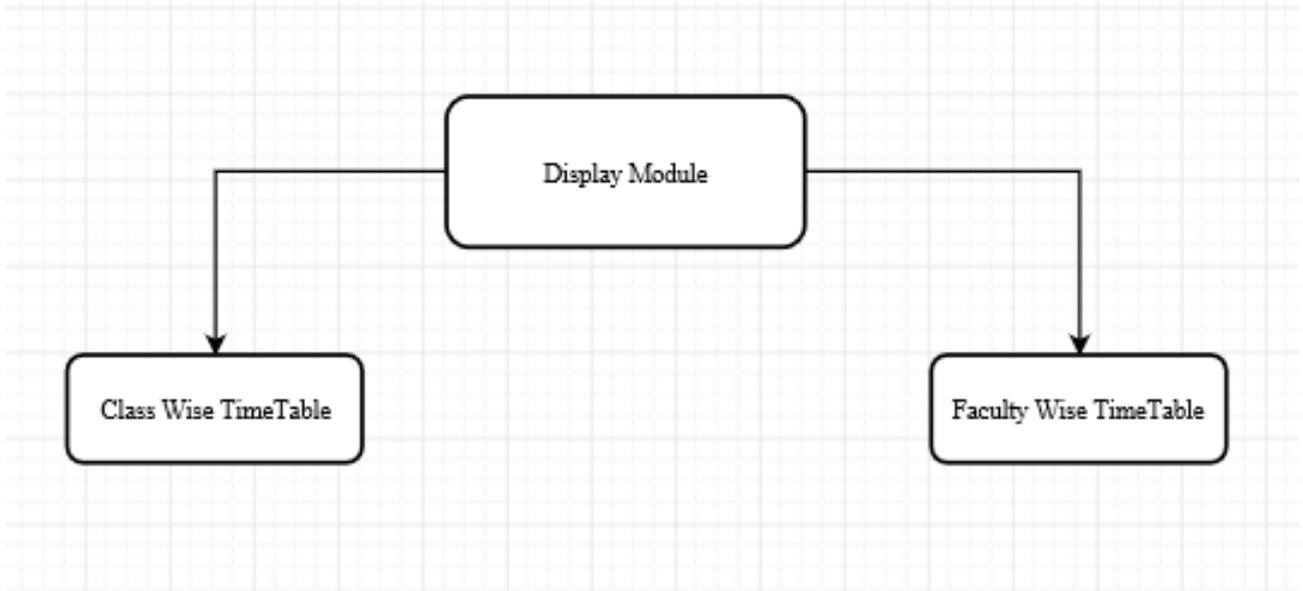   In this we can view all the subject name that are handled by a particular faculty.

Fig. 4 Display Module diagram for Time table scheduler

The system contains , Faculty and classs rooms.
Function : Subject allocation
Input :subject, faculty and semester
Output : timetable
      Logic:
              Step 1: Read subject , faculty and semester from the tables subject,faculty and semester respectively.
              Step 2:Validate the details and processing is done
              Step 3:subject allocated for facultys successfully in the table named Timetable.

Function : View Timetable
Input : Subject,Semester, Faculty
Output : Timetable
      Logic:
              Step 1: Read subject , faculty and semester from the tables subject, faculty and semester respectively.
              Step 2: Timetable generated successfully in the table called timetable.
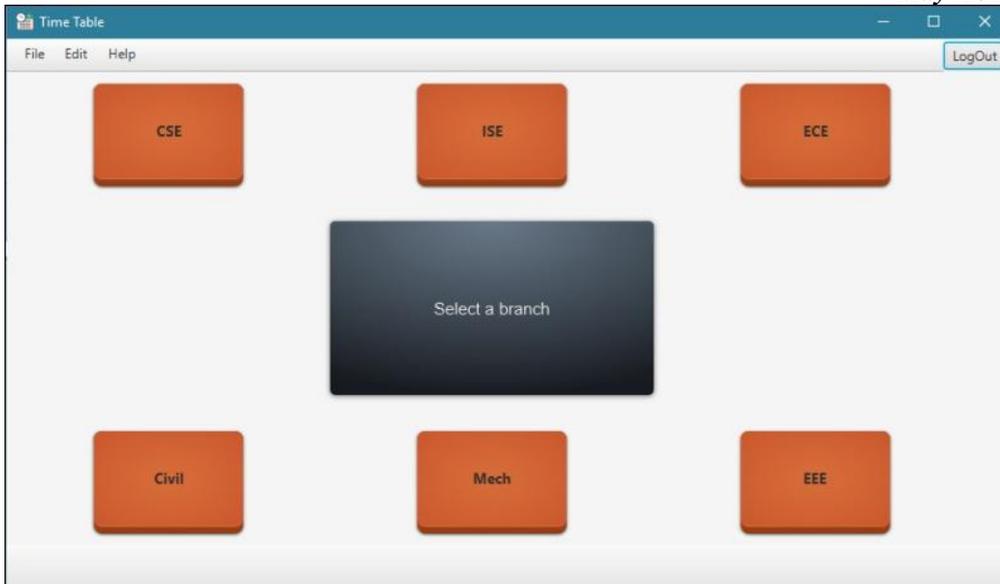
V. RESULT ANALYSIS

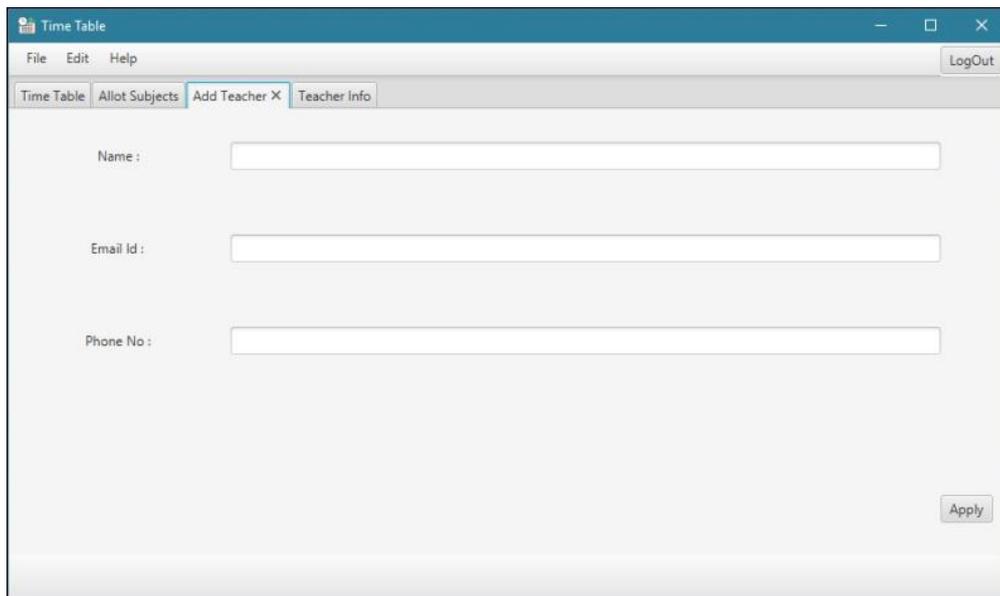Fig. 5 Login Window

Fig. 6 Selecting the Branch

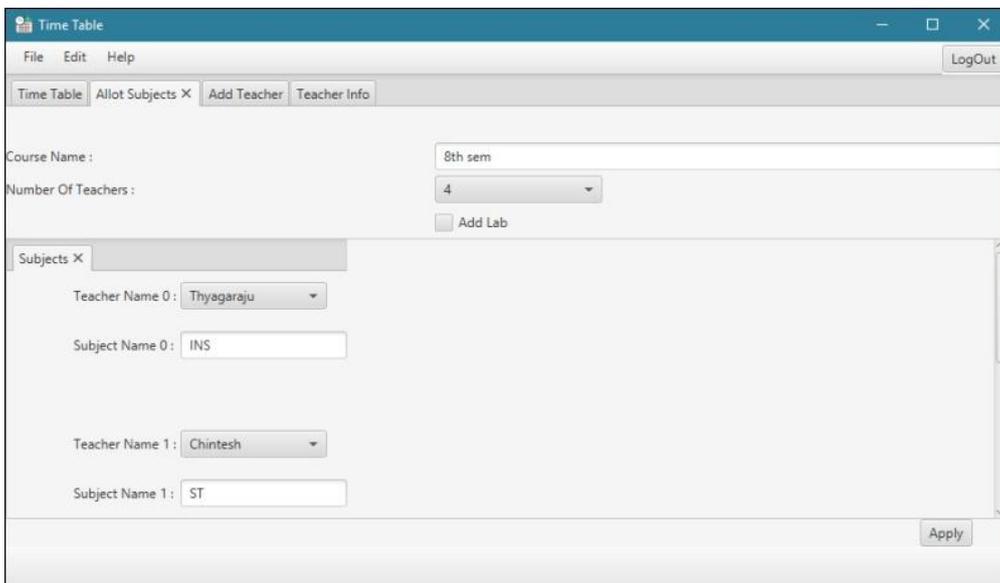Fig. 7 Window to add faculty details

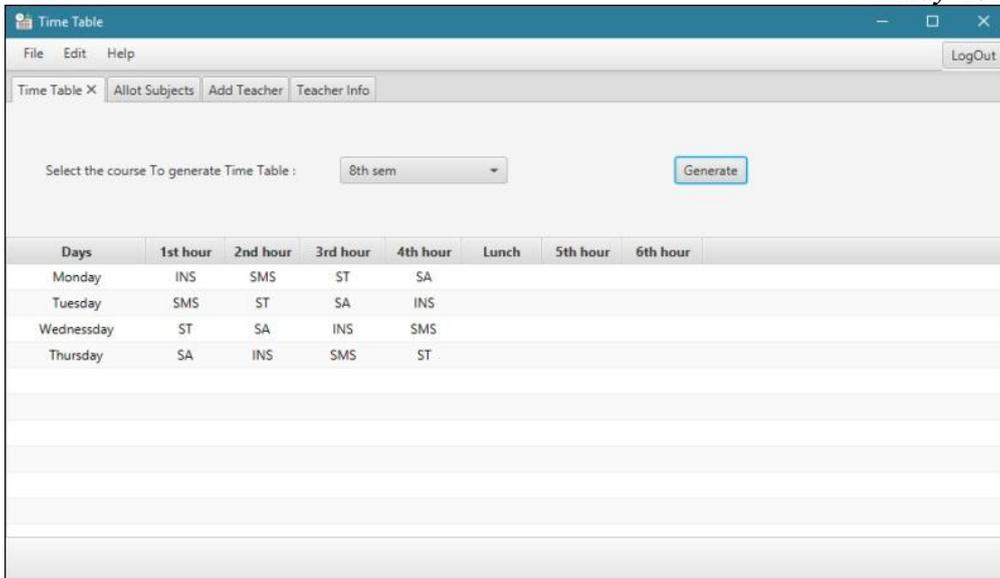Fig. 8 Filling the information of a class
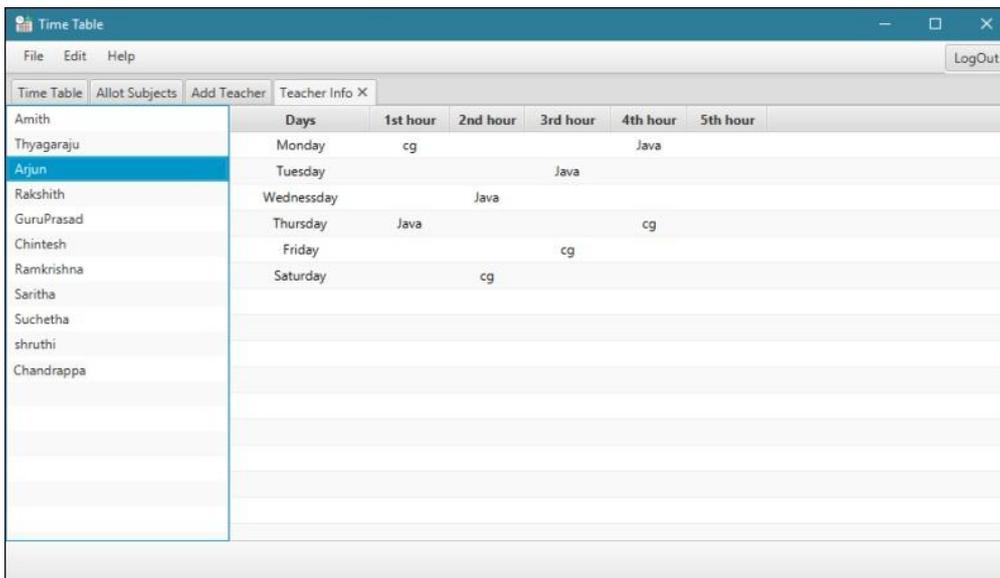
Fig. 9 Viewing the timetable of a class

Fig. 10 Viewing the timetable of a faculty

VI. CONCLUSION

Our approach of developing automated timetable system is successful in solving colleges'lecture-course timetabling problem. We have also shown that how we can fit our timetabling system as Rich Desktop Application. The graphical user interface (Windows FormApplication) used in this application provides an easy way in understanding how application works and also makes ease in providing the input.This application is provided with necessary details of faculty and subjects which are stored in database(SQL SERVER) and then by making use of the available data it generates the lecture-course timetable with minimum time when compared to manual generation of timetable and involves in satisfying all the constraints –

 No overlapping of time slots for any subject.
 There should be a minimum gap of one hour for respective faculty per subject
 No repetition of time slots per faculty.

REFERENCES
[1]   M.NANDHINI, AND S.KANMANI, "IMPLEMENTATION OF CLASS TIMETABLING USING MULTI AGENTS", (2009).
[2]   S. Abdullah, E. K. Burke and B. McCollum, "A Hybrid Evolutionary Approach to the   University   Course Timetabling Problem", Proceedings of the IEEE Congress Evolutionary Computation, Singapore, (2007).
[3]   Albert Cliai Meng l'att, Chia Wee Kee, Lee Chee Heong, Ng How Seng, Karen Ng Sor Har, Puah Suet Ni, Alvis Yeo Kok Yong, Mark Yeo Soon Hock, and Edmond C. Prakash, "SOFTWARE ENGINEERING APPROACH FOR A TIMETABLE GENERATQR", (2000).
[4]   Anirudha Nanda, Manisha P. Pai, and Abhijeet Gole, "An Algorithm to Automatically Generate Schedule for School Lectures Using a Heuristic Approach", (2012).

[5]   Asif Ansari, and Prof Sachin Bojewar, "Genetic Algorithm to Generate the Automatic Time-Table – An Over View", (2014).

[6]   Branimir Sigl, Marin Golub, and Vedran Mornar, "Solving Timetable Scheduling Problem by Using Genetic Algorithms".

[7]   Anisha Jain, Ganapathy S C Aiyer , Harshita Goel , and Rishabh Bhandari, "A Literature Review on Timetable generation algorithms based on Genetic Algorithm and Heuristic approach" (2015).

[8]   Dipesh Mittal , Hiral Doshi , Mohammed Sunasra , and Renuka Nagpure, "Automatic Timetable Generation using Genetic Algorithm" (2015).

[9]   Prof Er. Shabina Sayed, Ansari Ahmed, Ansari Aamir, and Ansari Zaeem, "Automated Timetable Generator" (2015).

[10]   Deeksha C S, A Kavya Reddy, Nagambika A, Akash Castelino, and K Panimozhi, "Automatic Timetable Generation System" (2015).

[11]   Antariksha Bhaduri, "University Time Table Scheduling using Genetic Artificial Immune Network", (2009).

[12]   Dipti Srinivasan, Tian Hou Seow, Jian Xin Xu, "Automated Time Table Generation Using Multiple Context Reasoning for University Modules", (2002).