

A Project Report on

Master Time-Table Generator

Submitted in partial fulfillment of the requirements for the award of
the degree of

Bachelor of Engineering

in

Computer Engineering

by

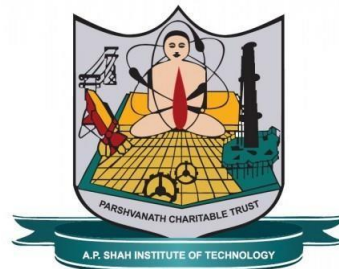
Suraj Thakkar(16102057)

Neel Dhruva(17202003)

Adesh Thosani(17202001)

Under the Guidance of

Dr. Rahul Ambekar



Department of Branch Name

A.P. Shah Institute of Technology

G.B.Road,Kasarvadavli, Thane(W), Mumbai-400615 UNIVERSITY
OF MUMBAI

Academic Year 2019-2020

Approval Sheet

This Project Report entitled "*Master Time-Table Generator*" Submitted by "*Suraj Thakkar*"(16102057), "*Neel Dhruva*"(17202003), "*Adesh Thosani*"(17202001) is approved for the partial fulfillment of the requirement for the award of the degree of *Bachelor of Engineering* in *Computer Engineering* from *University of Mumbai*.

(Dr. Rahul Ambekar) Guide

Prof. Sachin Malve
Head Department of Computer Engineering

Place: A.P. Shah Institute of Technology, Thane Date:

CERTIFICATE

This is to certify that the project entitled "*Title of project*" submitted by "*Suraj Thakar*" (16102057), "*Neel Dhruva*" (17202003), "*Adesh Thosani*" (17202001), for the partial fulfillment of the requirement for award of a degree *Bachelor of Engineering in Computer Engineering*, to the University of Mumbai, is a bonafide work carried out during academic year 2019-2020.

(Name)

Dr. Rahul Ambekar

Prof. Sachin Malve
Head Department of Computer Engineering

Dr. Uttam D.Kolekar
Principal

External Examiner(s)

1.

2.

Place: A.P. Shah Institute of Technology, Thane Date:

Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

(Suraj Thakkar 16102057)
(Neel Dhruva 17202003)
(Adesh Thosani 17202001)

Date:

Abstract

Many colleges use manual process of preparing academic timetables with large number of constraints and this is very time consuming. This usually ends up with various courses clashing, this may be either at same room or with same teachers having more than one course at a time. These are just due to common human errors which are very difficult to prevent and also a very hectic and cumbersome activity. To overcome all these problems we propose this application of Master Time Table Generator. There are many departments in a college/institute and each department has its own time table with sharing some common resources like rooms, infrastructure and faculty also , the master time table will generate the copy of time table integrating all time tables of various departments considering the needs of the said departments. It will be implemented with the information required such as Faculty Name, Faculty Load, Preference of the Time slot, Required hours for the faculty. The proposed application is intended to be used in any institutes irrespective of their discipline and number of departments.

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2.3	Automatic Timetable Generation System1Deeksha C S, 2A Kavya Reddy, 3Nagambika A, 4Akash Castelino, 5K Panimozhi1,2,3,4UG Student, 5Assistant Professor	4
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List of Abbreviations

GA:	Genetic Algorithms
EA:	Evolutionary Algorithms
SQL:	Structured Query Language

Chapter 1

Introduction

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. Timetable generator automatically schedules timetable for students and faculty which reduces the manual work. Once the inputs like faculty with their respective subjects are given it will generate the period slots for the given semester.

Objectives

1. The final system should be able to generate time table in completely automated way which will save lot of time and effort of an institute.
2. User defined constraints handling.
3. Ease of use of user of system so that he/she can make automated time table.
4. Focus on optimization of resources.
5. Generate multiple useful views from the timetable.
6. Managing all the information about semester course, faculty, and classrooms.
6. Building the application to reduce the manual handwork load.

Benefits for Society

1. It is a complicated task to handle many Faculty's and allocate subjects for them at a time physically.
2. So our proposed system will help to overcome this disadvantage. Thus we can produce a timetable for any number of courses and multiple semesters.
3. Separate timetables for the individual class, faculty and labs are generated automatically by this system.
4. The project reduces time consumption and the pain in framing the timetable manually.
5. The project is developed in such a way that, no slot clashes occur providing features to tailor the timetable as of wish.
6. It will save time and efforts. It will help to reduce errors. After successful completion of the project, The Master TimeTable can be used in many different Institutes.

The main goal and solution for the Problem

The main goal is to build the Master timetable that creates the time table without overlapping of lectures. This will be solved with the help of master time table generator project by using different technologies and algorithms.

Chapter 2 Literature

Review

Automated Time Table Generation Using Multiple Context Reasoning for University Modules

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.

Automatic Time Table Generator¹Saritha M, ²Pranav Kiran Vaze, ³Pradeep, ⁴Mahesh N R¹Assistant Professor,^{2, 3, 4} UG Scholar^{1, 2, 3, 4} Department of CSE, SDMIT Ujire, Karnataka, India

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.

Automatic Timetable Generation System

**1Deeksha C S, 2A
Kavya Reddy, 3Nagambika A, 4Akash Castelino, 5K
Panimozhi1,2,3,4UG Student, 5Assistant Professor**

This paper discusses the various approaches that can be taken to solve the timetable generation problem. Timetable generation is basically a constraint satisfaction problem. The methods discussed in this paper are capable of handling both soft and hard constraints

A time table is an organised list, usually set out in tabular form, providing information about the series of arranged events in a particular, the time at which it is planned these events will take place. They are applicable to any institute where the activities have been carried out by various individuals in a specified time frame. From the time institutes became organised environments, time tables have been the framework for all institutes activities. As a result institute has devoted time, energy and human capital to the implementation of nearly optimisation time tables which must be to satisfy all required constraints as specified by faculties. The lecture timetabling problem is a typical scheduling problem that appears to be a tedious job in every academic institute twice a year. The problem involves the scheduling of classes, Students, Teachers and rooms at fixed number of time slots, Subject to a certain number of constraints. An effective time table is crucial for the satisfaction of educational requirements and efficient utilisation of human resources which make an optimisation problem.

Chapter 3

Flow of Modules

1. Department Level Module
2. Faculty and Resource allocation Module
3. Admin Module
4. Integration of department Module
5. Master Time-Table Module

Department Level Module

Firstly the timetable will be generated for one department. There will be different inputs taken such as semester name, Faculty name, different Time slots.

Faculty and resource allocation Module

The faculty gives all of their details to the admin. In the case, at times the faculty could take a leave as well. In times like these, the faculty is responsible to send the reason, date and on which period the leave is to be taken. The substitute faculty gets the request. The substitute faculty has the facility to either accept or reject the substitute hour. Then this is sent back to the faculty informing about the request. According to the timetable is modified.

Admin Module

The admin is responsible for taking all the details of the faculty, course, subject, semester and how many hours a day the classes last. The admin generates the timetable according to all these factors.

Integration Module

Above all the created department level timetables will be integrated to form a master timetable.

Master Time-Table Module

In this module, generation is done by considering the maximum and minimum workload for each faculty. This will be generated by the admin and viewed by the faculty who are the users of this system.

Chapter 4

Project Design

Proposed System

Proposed System

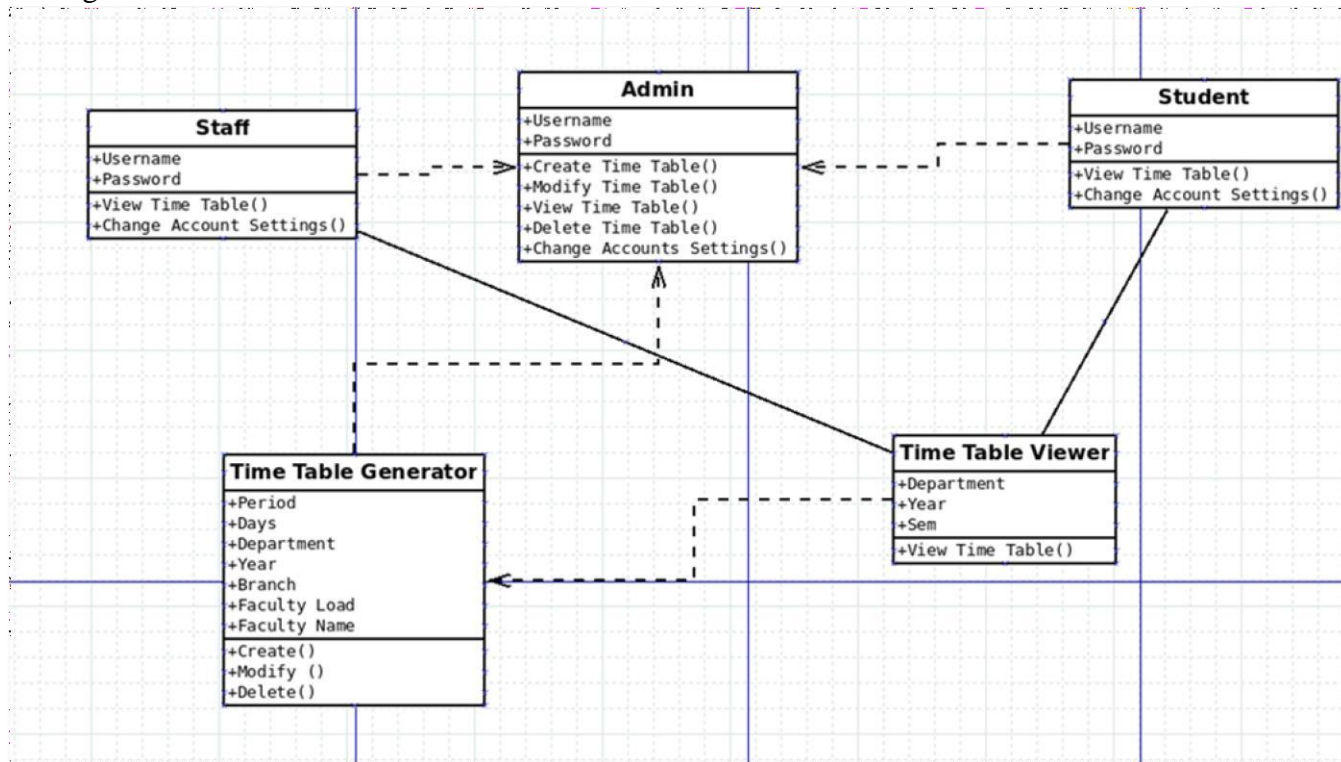
The proposed system is designed to be more efficient than the actual manual system. Most colleges have a number of different courses and each course has 'n' number of subjects. Now there are limited faculties, and each faculty might be teaching more than one subjects. So now the time table needed to schedule all the faculty at provided time slots in such a way that their timings do not overlap and the time table schedule will make the best use of all faculty subject demands.

Description of Class Diagram

Description of Class Diagram The diagram represents Class Diagram for Time Table Generator system. Here student , faculty, timetable generator were depend on administrator because the administrator can able to modify the details of the students, Faculty and timetable. So dependency relationship is exist between students and administrator, Faculty and administrator. This dependency is also exist between the timetable generator and timetable viewer. since because we can view timetable only after it is generated.

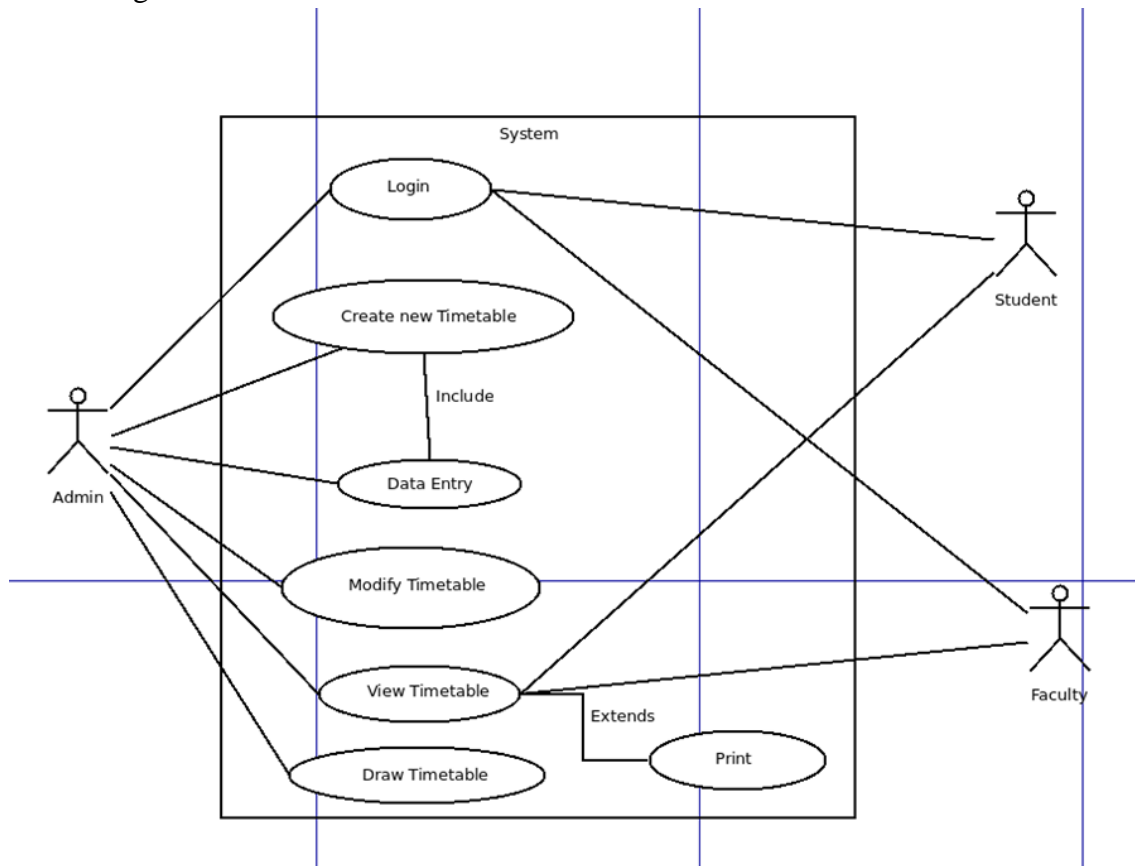
Class Diagram

Class Diagram



Use Case Diagram

Use Case Diagram



Chapter 5

Implementation

In this project we have used Genetic Algorithm. Genetic algorithm works as follows:-

Fitness function finds number of lectures clashing between rooms. The timetable with less fitness score is the best. The crossover does nothing but shuffles the 'TimeSlots' for the 'Day'. The 'Day' is picked from a random 5 days of the week. These timeslots are maintained in a list and shuffling the timeslots of days in all the classroom produces a new child Time table.

In this we give Department, Room Number, Faculty Name, Subjects (Along with Faculty name), And Number of Lectures required in a week as a input and we get the generated output for each class.

```
public void readInput() throws IOException{

    ArrayList<ClassRoom> classroom=new ArrayList<>();
    ClassRoom room1 = new ClassRoom("201", 20, false, "Common");
    classroom.add(room1);
    ClassRoom room2 = new ClassRoom("202", 10, false, "ComputerScience");
    classroom.add(room2);
    ClassRoom room3 = new ClassRoom("203", 20, false, "ComputerScience");
    classroom.add(room3);
    ClassRoom room4 = new ClassRoom("204", 15, false, "ComputerScience");
    classroom.add(room4);
    ClassRoom room5 = new ClassRoom("G101", 20, false);
    classroom.add(room5);
    ClassRoom room6 = new ClassRoom("H101", 20, false);
    classroom.add(room6);
    ClassRoom room6 = new ClassRoom("I101", 60, false);
    classroom.add(room6);

    professors.add(new Professor(1, "Sachin", "DWM/m1/P1"));
    professors.add(new Professor(2, "Pravin", "CSS/m2/P2"));
    professors.add(new Professor(3, "Amol", "AA/m3/P3"));
    professors.add(new Professor(4, "Brinal", "PM/m4/P4"));
    professors.add(new Professor(5, "Ramya", "DS/m5/P5"));
    professors.add(new Professor(6, "Archana", "DSIP/m6/P6"));
    professors.add(new Professor(7, "Marlin", "CCL/m7/P7"));
    professors.add(new Professor(8, "Mayuri", "OSTL/m8"));
    professors.add(new Professor(9, "Jaya", "ML/m9"));
```

```

TimeTable timetb1=new TimeTable(classroom, classes);//, professors);
//timetb1.initialization(classroom, classes);
//TimeTable timetb2=new TimeTable(classroom, classes);
//TimeTable timetb3=new TimeTable(classroom, classes);

int courseid = 1;
String courseName="Computer1";
System.out.println("reading input.....");
subjects.add(new Subject(1,"DWM",4,false, "ComputerScience"));
subjects.add(new Subject(2,"CSS",4,false,"ComputerScience"));
subjects.add(new Subject(3,"AA",4,false,"ComputerScience"));
subjects.add(new Subject(4,"",1,false,"Common"));
subjects.add(new Subject(5,"DS",4,false,"ComputerScience"));
subjects.add(new Subject(6,"DSIP",3,false,"ComputerScience"));
subjects.add(new Subject(7,"ML",3,false,"ComputerScience"));

System.out.println("new course creation.....");
Course course1 = new Course(courseid, courseName, subjects);
course1.createCombination("DWM/CSS/AA/PM/DS/DSIP/ML/", 20);
course1.createStudentGroups();
ArrayList<StudentGroups> studentGroups = course1.getStudentGroups();
timetb1.addStudentGroups(studentGroups);
//combinations.addAll(course1.getCombinations());

//timetb2.addStudentGroups(studentGroups);
//timetb3.addStudentGroups(studentGroups);
subjects.clear();

```

For this Input the desired output is:-

21	
22	Room Number: 203
23	
24	Timings: 9:00 TO 10:00 TO : 10:00 TO : 11:00 TO : 12:00 TO : 13:00 TO : 14:00 TO : 15:00 TO 16:00
25	Days
26	Monday (AA#Amol (ML#Jaya# FREE LECT BREAK (DSIP#Arc FREE LECT (DWM#Sachin#Computer1
27	Tuesday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
28	Wednesday (DWM#Sa (CSS#Prav (DWM#Sa BREAK (DS#Ramy (ML#Jaya# (DS#Ramy#Computer1
29	Thursday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
30	Friday (DS#Ramy (DSIP#Arc (CSS#Prav BREAK (ML#Jaya# (DS#Ramy (AA#Amol#Computer1
31	Saturday (CSS#Prav (DSIP#Arc (CSS#Prav BREAK (AA#Amol (AA#Amol (DWM#Sachin#Computer1
32	
33	

Chapter 6

Testing

In our project we had tried different test cases to avoid collision. here are some of the testing results:

```
//timetb2.addStudentGroups(studentGroups);
//timetb3.addStudentGroups(studentGroups);
subjects.clear();

subjects.add(new Subject(8,"m1",4,false,"ComputerScience"));
subjects.add(new Subject(9,"m2",4,false,"ComputerScience"));
subjects.add(new Subject(10,"m3",1,false,"ComputerScience"));
subjects.add(new Subject(11,"",1,false,"Common"));
subjects.add(new Subject(12,"m8",4,false,"ComputerScience"));
subjects.add(new Subject(13,"m6",3,false,"ComputerScience"));
subjects.add(new Subject(14,"m4",6,false,"ComputerScience"));

Course course2 = new Course(2, "Computer2", subjects);
course2.createCombination("m1/m2/m3/m4/m5/m6/", 10);
course2.createStudentGroups();
studentGroups = course2.getStudentGroups();
timetb1.addStudentGroups(studentGroups);
```

For this Input The desired Output is:-

46	
47	
48	Room Number: 202
49	
50	Timings: 9:00 TO 10:00 TO : 10:00 TO : 11:00 TO : 12:00 TO : 13:00 TO : 14:00 TO : 15:00 TO 16:00
51	Days
52	Monday (m4#Brin (m1#Sach (m1#Sach BREAK (m1#Sach (m4#Brin (m4#Brin#Computer2)
53	Tuesday (m6#Arch (m2#Pravi (m8#Mayi BREAK (m8#Mayi (m8#Mayi (m2#Pravin#Computer2)
54	Wednesday (m4#Brin (m8#Mayi (m2#Pravi BREAK (m6#Arch (m4#Brin (m2#Pravin#Computer2)
55	Thursday FREE LECT FREE LECT (m6#Arch BREAK (m1#Sach (m4#Brin (m3#Amol#Computer2)
56	Friday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
57	Saturday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
58	
59	
60	
61	

```

subjects.add(new Subject(8,"P1",4,false,"ComputerScience"));
subjects.add(new Subject(9,"P2",4,false,"ComputerScience"));
subjects.add(new Subject(10,"P3",1,false,"ComputerScience"));
subjects.add(new Subject(11,"",1,false,"Common"));
subjects.add(new Subject(12,"P4",4,false,"ComputerScience"));
subjects.add(new Subject(13,"P5",3,false,"ComputerScience"));
subjects.add(new Subject(14,"P6",6,false,"ComputerScience"));

Course course3 = new Course(3, "Computer3", subjects);
course3.createCombination("P1/P2/P3/P4/P5/P6/", 15);
course3.createStudentGroups();
studentGroups = course3.getStudentGroups();
timetb1.addStudentGroups(studentGroups);
//combinations.addAll(course2.getCombinations());
//timetb2.addStudentGroups(studentGroups);
//timetb3.addStudentGroups(studentGroups);

```

For this input the desired output is:-

10	
11	Timings: 9:00 TO 10:00 TO : 11:00 TO : 12:00 TO : 13:00 TO : 14:00 TO : 15:00 TO 16:00
12	Days
13	Monday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
14	Tuesday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
15	Wednesday (P2#Pravir (P5#Ramy (P6#Archa BREAK (P2#Pravir (P6#Archa (P4#Brinal#Computer3)
16	Thursday (P6#Archa (P6#Archa (P1#Sachi BREAK (P3#Amol (P2#Pravir (P2#Pravin#Computer3)
17	Friday (P1#Sachi (P1#Sachi (P5#Ramy BREAK (P5#Ramy FREE LECT FREE LECTURE
18	Saturday (P1#Sachi (P6#Archa (P6#Archa BREAK (P4#Brinal (P4#Brinal (P4#Brinal#Computer3)
19	
20	

For this class classroom we have not assigned any lectures so this is showing free lectures.

34	
35	Room Number: 201
36	
37	Timings: 9:00 TO 10:00 TO : 11:00 TO : 12:00 TO : 13:00 TO : 14:00 TO : 15:00 TO 16:00
38	Days
39	Monday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
40	Tuesday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
41	Wednesday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
42	Thursday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
43	Friday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
44	Saturday FREE LECT FREE LECT FREE LECT BREAK FREE LECT FREE LECT FREE LECTURE
45	
46	

Chapter 7

Result

These results immediately induce new directions of research for finding new approaches on representation, in which instead of looking for a particular solution for a specific problem, GAS are used for searching for a good algorithm that solve the problem.

Chapter 8

Conclusions and Future Scope

A Time-Table management system involves everything that is required for the efficient working of a Institute. Managing timetables, routing, Planning and allotting Load of the Faculties. Creating timetables are one of the biggest headaches for Faculties. It can be confusing and time-consuming when done manually. Timetable management software is the best solution in such situations. 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, computer room) and rules applicable at different classes, semesters, teachers and subject level. Best of all, this timetable generation system tremendously improves resource utilization and optimization. This will reduce load from the faculties.

Bibliography

- [1] Meysam Shahvali Kohshori, Mohammad saniee abadeh, Hedieh Sajedi “A fuzzy genetic algorithm with local search for university course timetabling” 2008 20th IEEE International conference [1].
- [2] Abramson D., Abey, A Parallel genetic algorithm for Solving the school Timetabling Problem., Royal Melbourne Institute of technology, 1991 [2] .
- [3] MILENA KAROVA Department of Computer Science Studentska I Trčinska Univerzita Varna [3].

Appendices

Detailed information, lengthy derivations, raw experimental observations etc. are to be presented in the separate appendices, which shall be numbered in Roman Capitals (e.g. “Appendix I”). Since reference can be drawn to published/unpublished literature in the appendices these should precede the “Literature Cited” section.

Appendix-A: NS2 Download and Installation

1. Download `wamp` from
`https://sourceforge.net/projects/wampserver/`
2. Go to terminal and do as following command
`sudo apt-get update`
`sudo apt-get install mysql-server`
3. For access of mysql
`$sudo ufw enable`
`$sudo ufw allow mysql`
4. Start Mysql service
`$ sudo systemctl start mysql`

Acknowledgement

We have great pleasure in presenting the report on **Master Time-Table Generator**. We take this opportunity to express our sincere thanks towards our guide **Dr. Rahul Ambekar** & Co-Guide **Co-Guide Name** Department of computer Engineering, APSIT thane for providing the technical guidelines and suggestions regarding line of work. We would like to express our gratitude towards his constant encouragement, support and guidance through the development of project.

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Suraj Thakkar
16102057

Neel Dhruva
17202003

Adesh Thosani
17202001

Reference

- Meysam Shahvali Kohshori, Mohammad saniee abadeh, Hedieh Sajedi “A fuzzy genetic algorithm with local search for university course timetabling” 2008 20th IEEE International conference [1].
- Abramson D., Abenh, A Parallel genetic algorithm for Solving the school Timetabling Problem., Royal Melbourne Institute of technology, 1991 [2] .
- MILENA KAROVA Drparliiieit of Cantpuler Scierice Studenrska I Trcliniral Uiiiversily Vama [3].

Publication

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