



# **AUTOMATIC TIME TABLE GENERATOR**

A Report for the Evaluation 3 of Project 2

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## **Abstract:**

Time table generation is tedious job for educationalist with respect to time and man power. Providing a automatic time table generator will help to generate time table automatically. Proposed system of our project will help to generate it automatically also helps to save time. It avoids the complexity of setting and managing Timetable manually. In our project we are going to use algorithms like genetic, heuristic, resource scheduling to reduce these difficulties of generating timetable. These algorithms incorporate a numeral of strategy, aimed to improve the operativeness of the search operation. The system will take various inputs like number of subjects, teachers, workload of a teacher, semester, priority of subject. By relying on these inputs, it will generate possible time tables for working days of the week for teaching faculty. This will integrate by making optimal use of all resources in a way that will best suit the constraints.

An efective timetable is crucial for the satisfaction of enormousrequirement and the efficient utilization of human and spaceresources, which make it an optimization problem. Traditionally, the problem is solved manually by hit and trialmethod, where a valid solution is not guaranteed. even if a validsolution is found it is likely to miss for better solution. Theseuncertantities have motivated for the scientific study of problem,and to develop an automated solution technique for it. Theproblem is heavily studied for last more than four decades but ageneral solution technique is yet to be formulated.

Timetabling problem can be de!ned to be the problem of arranging a number of events into a limited number of timetabling as follows:

Timetabling is the allocation of subject to constraints that are usually divided into two categories hard and soft.

For achieving the problem statement, in this paper we are goingto implement a genetic algorithm. Genetic algorithm is the algorithm which generates a various possible solution and finally selects the one which the best amongst those solution.

Timetabling problems are mainly classified as constraint satisfaction problems where the main goal is to satisfy all problem constraints rather than optimizing a number of objectives. Scheduling is the arrangement of entities (people, students,lectures, and exam) into a pattern in space time in such a way that constraints are satisfied and certain goals are achieved.

## Introduction:

Time table scheduling has been in human requirements since they thought of managing time effectively. It is widely used in schools, colleges and other fields of teaching and working like crash courses, In early days, time table scheduling was done manually with a single person or some group involved in task of scheduling it with their hands which take lot of effort and time. While scheduling even the smallest constraints can take a lot of time and the case is even worse when the number of constraints or the amount of data to deal with increases. Even the perfectly designed time table is reused for whole generation without any changes, proving to be dull in such situations. Other cases are caused because the problem is the number of employers or workers keeps changing, this result in rescheduling of time table urgently.

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. A college timetable is a temporal arrangement of a set of lectures and classrooms in which all given constraints are satisfied. Creating such timetables manually is complex and time-consuming process. By automating this process with computer assisted timetable generator can save a lot of precious time of administrators who are involved in creating and managing course timetables.

Since every college has its own timetabling problem, the commercially available software packages may not suit the need of every college. Hence we have developed practical approach for building lecture course timetabling system, which can be customized to fit to any colleges timetabling problem. The college lecture-timetabling problem asks us to find some time slots and classrooms which satisfy the constraints imposed on offered.

Our Timetabling Algorithm is main component of our project which produces the HTML based timetable even / odd semester sheet as the output. Our project takes various inputs from the user such as Teacher List, Course List, Semester List, Room List, Day List and Timeslot as well as various rules, facts and constraints using web based forms, which are stored in XML based knowledge base. This knowledge base serves as input to our Timetable Generator Algorithm residing on server machine. Our knowledge base is in the middle, because it is between our timetabling algorithm and GUI front end which is designed in the last. After the representation of KB is standardized, we designed the timetabling algorithm.

The design of timetabling algorithm took most of our total time. During design of algorithm, first problem was, from where to start? Second problem was, does it really going to work? But after all due to our superior design of knowledge base, flowcharts and enough

thinking on timetabling data structure representation helped us to really boosted building our fineworking algorithm.

The proposed system is a website, which allows the student a good user interface also it provides a good user interface to admin & faculties, and they can easily get the required information. The web site provides a variety of facilities to students, admin and faculties. The main modules of the proposed system are Administrator, faculties & student.

## **Module Description:**

Time Table Generator is a web based application which guides you about time table management. This project includes mainly two modules i.e. login and main page.

### **Login:**

1. Admin
2. Student
3. Staff

**Admin:** The page require user id and password to start the application. Login is a process by which individual access to a computer system is controlled by identifying and authenticating the user through the cardinalities presented by the user. Admin can add or delete the category, subcategory etc.

**Student:** Student can register the account by clicking on new register. He/she can add the account for the various Courses. The student have to login to get more information about the time schedule.

**Staff:** Staff can register by admin. The staff have to login to get more information about the time schedule.

## **Scope Of Project:**

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. We use a genetic algorithm for this purpose.

In our Timetable Generation algorithm we propose to utilize a timetable object. This object comprises of Classroom objects and the timetable for every them 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. also 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 Also further on discussing the imperatives, We have utilized composite configuration design, which make it well extendable to include or uproot as numerous obligations. In every obligation class the condition as determined in our inquiry is now checked between two timetable objects. On the off chance that condition is fulfilled i.e there is a crash is available then the score is augmented by one.

As this is web based project, it is easier to fetch the data from the database and remove the unwanted data by just clicking the delete button. This project will limit the time and money factor involve in the time table management system.

The maintenance of this web based is much easier and accurate than the existing manual system. As this web based system, the security features are somehow higher than the manual system.

In this system, there is less chance of mishandling of the data because only the administrator will login through their login id and password and upload all the related data and generate the time table. So there is no misuse of the data.

## **Existing 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 manager is a PHP 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.

## **Hardware Requirements:**

Processor : IntelDualCore.

Hard Disk : 60GB.

Floppy Drive: 1.44Mb.

Monitor: LCD Colour.

Mouse: Optical.

RAM : 512Mb.

## **Software Requirements:**

Language : PHP.

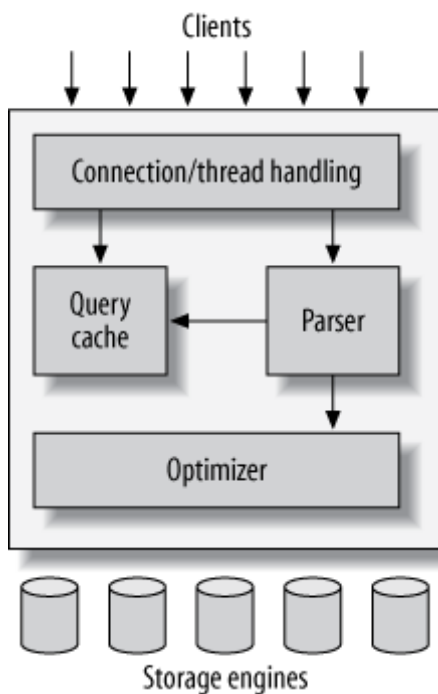
Database :MYSQL.

## PHP:

PHP is now officially known as “**PHP: Hypertext Preprocessor**”. It is a server-side scripting language usually written in an HTML context. Unlike an ordinary HTML page, a PHP script is not sent directly to a client by the server; instead, it is parsed by the PHP binary or module, which is server-side installed. HTML elements in the script are left alone, but PHP code is interpreted and executed. PHP code in a script can query databases, create images, read and write files, talk to remote servers – the possibilities is endless. The output from PHP code is combined with the HTML in the script and the result sent to the user’s web-browser, therefore it can never tell the user whether the web-server uses PHP or not, because the entire browser sees is HTML.

PHP’s support for Apache and MySQL further increases its popularity. Apache is now the most-used web-server in the world, and PHP can be compiled as an Apache module. MySQL is a powerful free SQL database, and PHP provides a comprehensive set of functions for working with it. The combination of Apache, MySQL and PHP is all but unbeatable.

## My SQL’s Logical Architecture:





## Proposed System:

The figure1 represents timetable generator consists input module, and as output timetable will be generated.

### A. Input Data

The input data module can be described by a type of data given, the data contains:

- Person: which describe the name of lecturers.
- Subject: which describe the name of the subjects belonging to desired year and semesters.
- Room: which describe the name of the class.
- Time interval: it's a time slot with a starting time and duration.

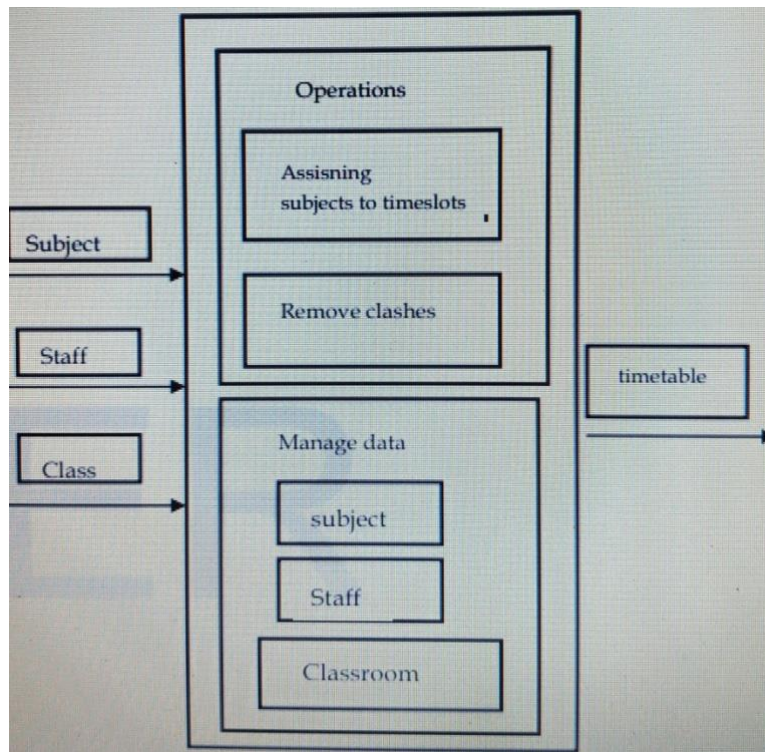


Fig1.system model

## B. Constraints

Constraints can be divided into 3 parts:

- Validity violation constraints.
- Hard constraints.
- Soft constraints.

### 1) Validity violation constraints:

These are the constraints which are needed to be followed:

- There are certain lecturers that may appear at the same time in more than one class.
- The most trivial violation constraint is that a teacher must not clash in two different tables of a time table.
- Fixed slots.

### 2) Hard constraints:

Hard constraints are the one's which needs to be fulfilled necessarily.

- Class room must not be double booked.

Every class must be scheduled exactly once.

### 3) Soft constraints:

These are the constraints that are not that obvious but still demanding. They are not to be really satisfied but the solutions are generally considered good if large numbers of them are taken care.

- No consecutive lectures of the same teacher in the class.
- Minimize continuous lectures of the same course in a day.
- Same teacher must not have consecutive periods unless specified.

- Assigning fixed slots for particular subjects.

The final system should be able to generate time tables in a completely automated way which will save a lot of time and effort of an institute administration. To make a timetable system generic so that it can work equally well for different Schools, 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.

## **Implementation:**

This system is implemented using the minimum hardware requirements like RAM 512MB and above, hard disk used is 20GB or above, processor used is 2.4GHz or above, display is standard output display and data input is keyboard/mouse. Software requirements deal with defining software resource requirements and prerequisites that need to be installed on a computer to provide optimal functioning of an application. These requirements or prerequisites are generally not included in the software installation package and need to be installed separately before the software is installed. Languages used are PHP, HTML, CSS, Database used is MYSQL, Compiler is Xampp or Wamp5, Operating system is Windows 7/8/10.

## **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.

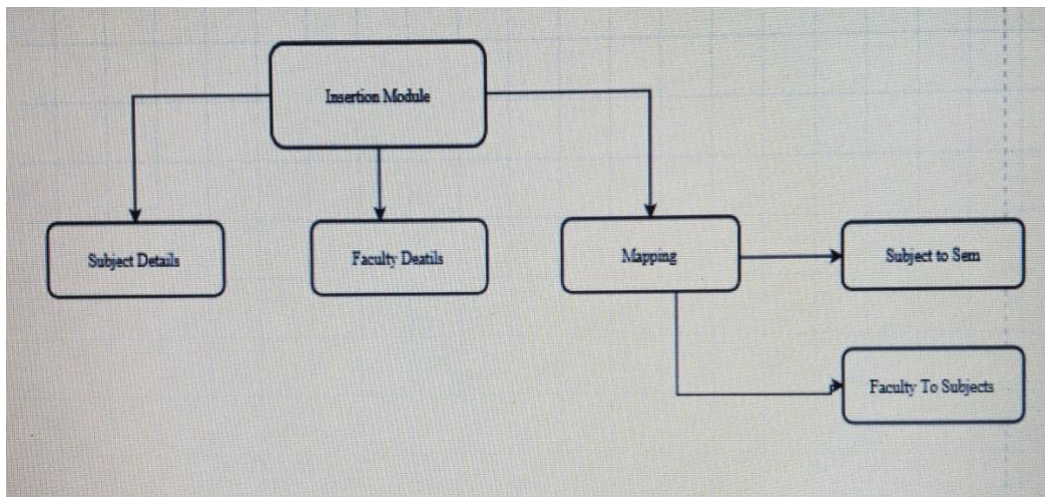


Fig.2 Insertion Module Diagram for Time Table Scheduler

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

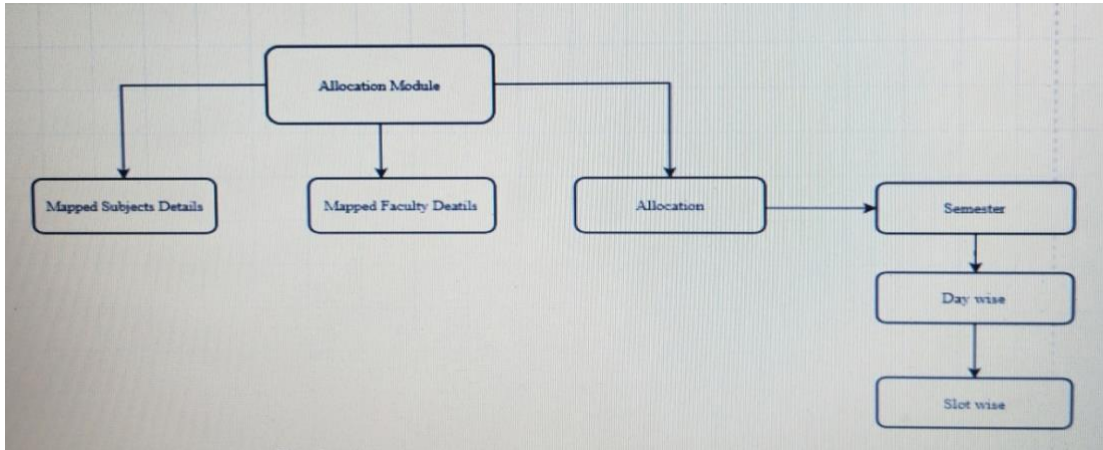


Fig.3 Allocation Module diagram for Time Table Scheduler

### 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.

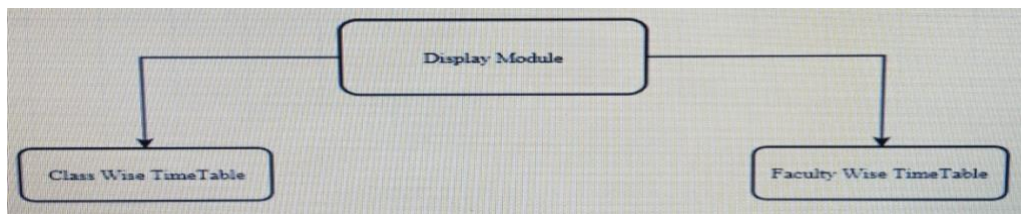


Fig.4 Display Module Diagram for Time Table Scheduler

## Architecture Diagrams:

### Data Flow Diagram(DFD):

A data flow diagram(DFD) is a graphical representation of the flow of data. The purpose of DFD is to clarify system requirements and identify major transformations that will become program in system design. So it is the starting point of the design phase that functionally decomposes the requirements specifications to the lowest level in detail. These diagrams help to understand the basic working of the system. The DFD of Time Table Generator in Fig.5

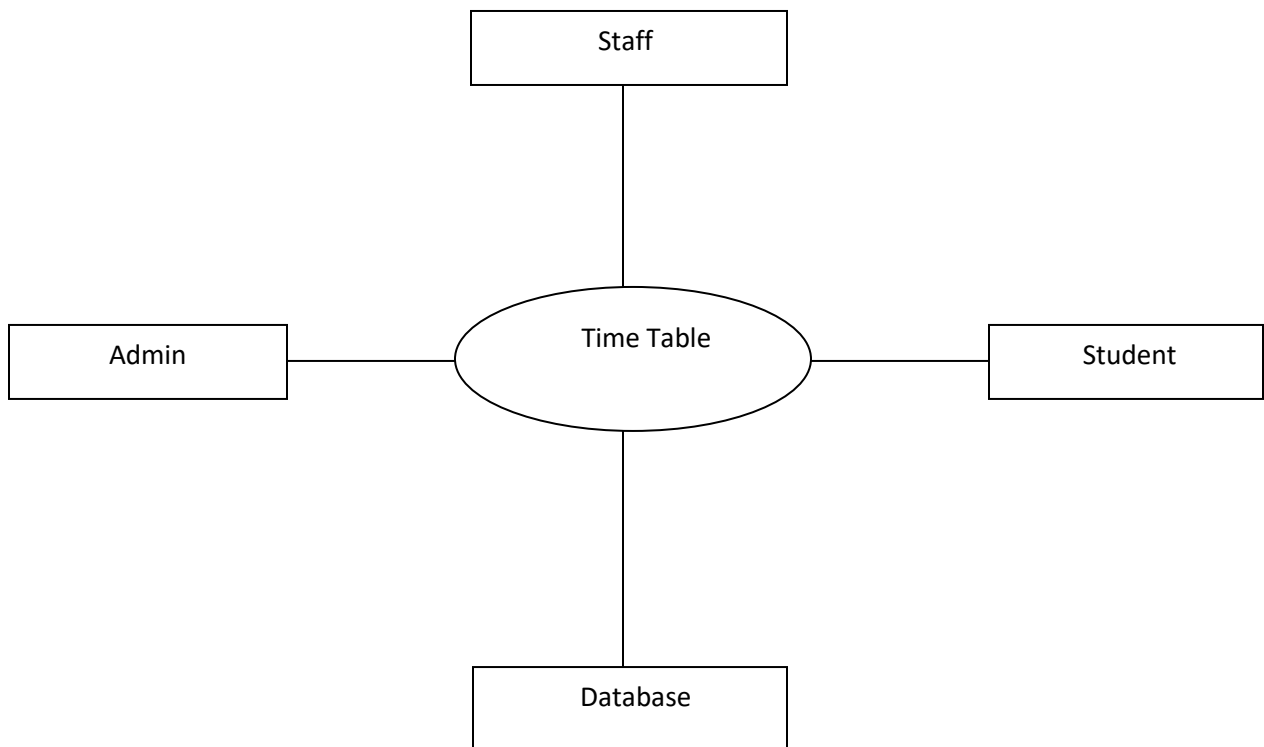


Fig.5 DFD of Time Table Generator

### Entity Relationship(ER) Diagram:

Entity relationship model defines the conceptual view of database. It works around real world entity and association among them. At view level, ER model is considered well for designing databases.

**Entity Set:** An entity set is a collection of similar types of entities. Entity set may contain entities with attribute sharing similar values. For example, Students set may contain all the student of a school; likewise Teachers set may contain all the teachers of school from all faculties. Entities sets need not to be disjoint.

**Attributes:** Entities are represented by means of their properties, called attributes. All attributes have values. For example, a student entity may have name, class, age as attributes.

**ER DIAGRAM FOR COLLEGE TIME TABLE MANAGEMENT SYSTEM**

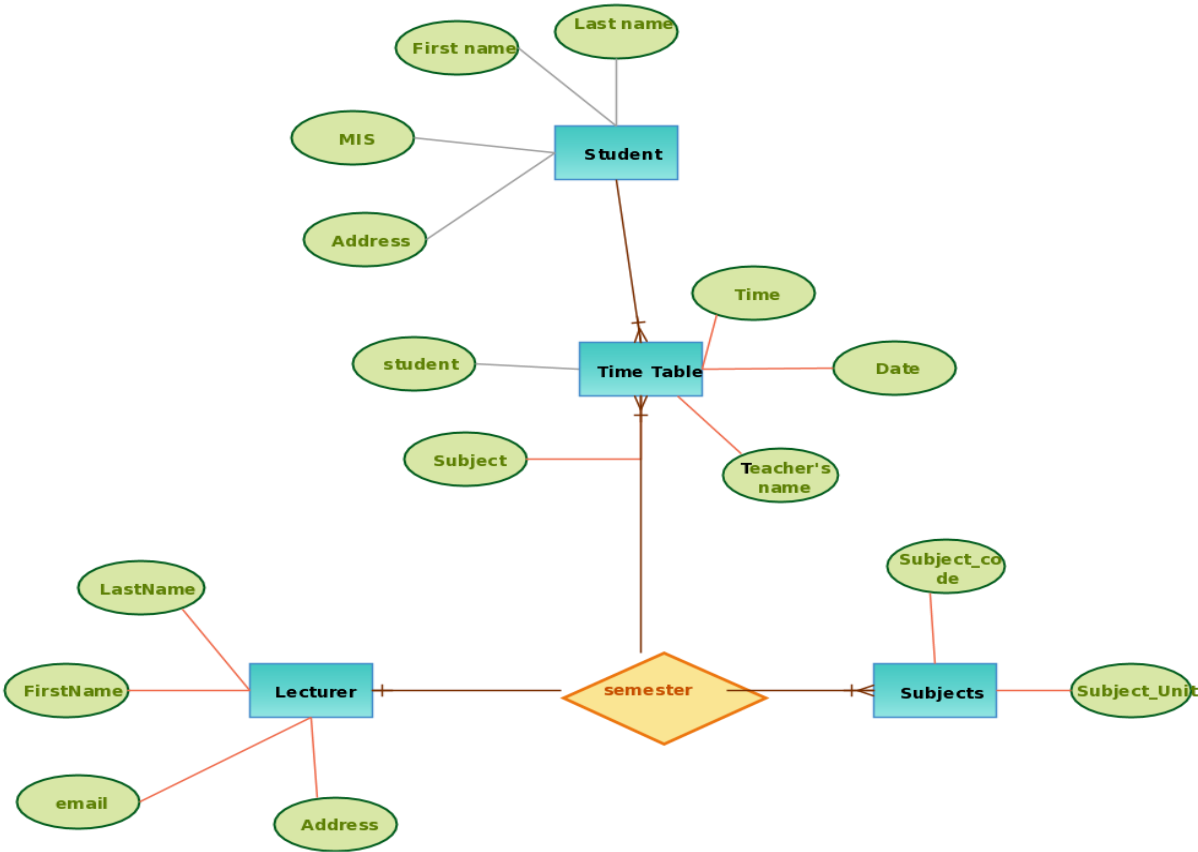


Fig.6 ER diagram for Time Table Management



## **Output / Result:**

The final system should be able to generate time tables in completely automated way which will save a lot of time and effort of a department administration. Focus on optimization of resources i.e., teachers, classrooms etc. Provide a facility for everyone to view the time table. This application is provided with necessary details of faculty and subjects which are stored in database and then by making use of available data it generates timetable with minimum time when compared to manual generation of timetable.

The system contains , Faculty and classs rooms.

Function : Subject allocation

Input :subject, faculty and semester

Output : timetable

Logic:

- Step1      Read subject , faculty and semester from the tables subject, faculty and semester respectively.
- Step2      Validate the details and processing is done.
- Step3      subject allocated for facultys successfully in the table named Timetable.

Function : View Timetable

Input : Subject, Semester, Faculty

Output : Timetable

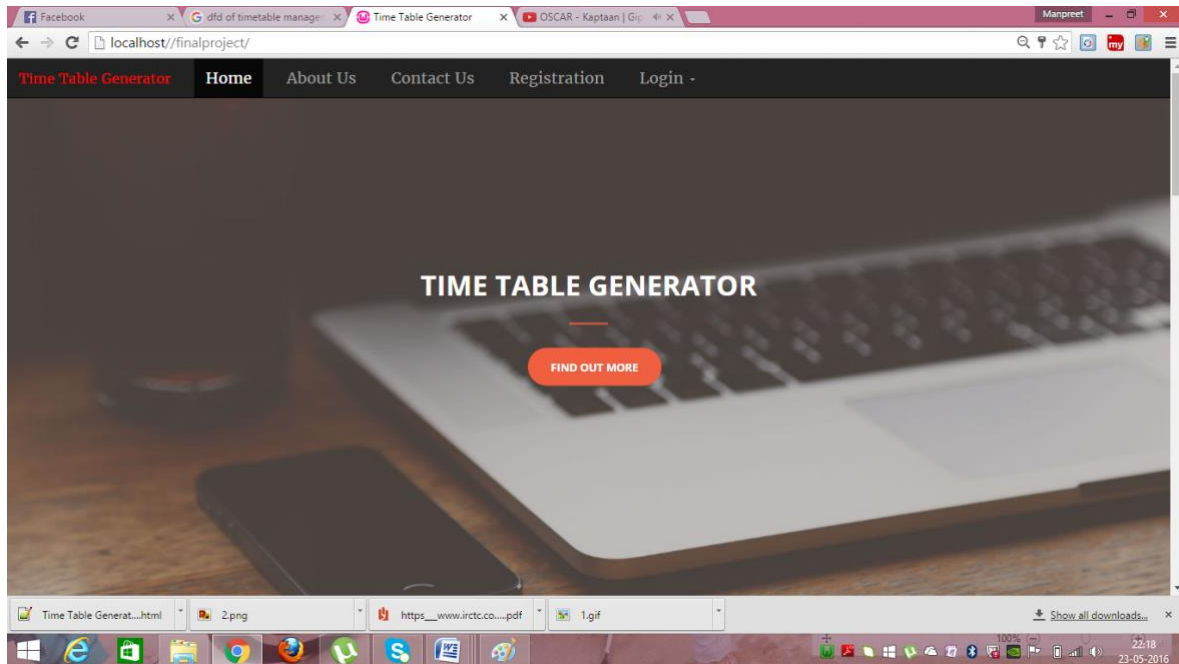
Logic:

- Step1      Read subject , faculty and semester from the tables subject, faculty and semester respectively.
- Step2      Timetable generated successfully in the table called timetable.

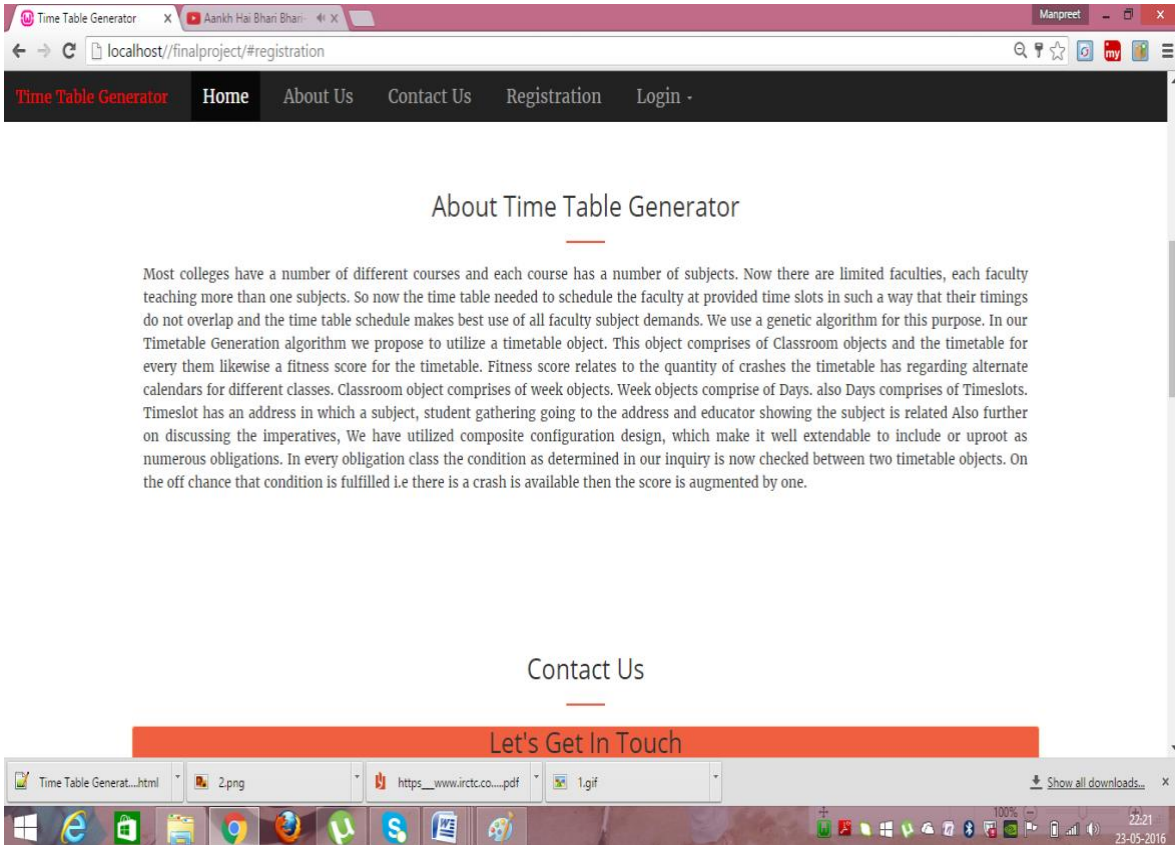
## **Screenshots of Time Table Generator:**

### **User Panel**

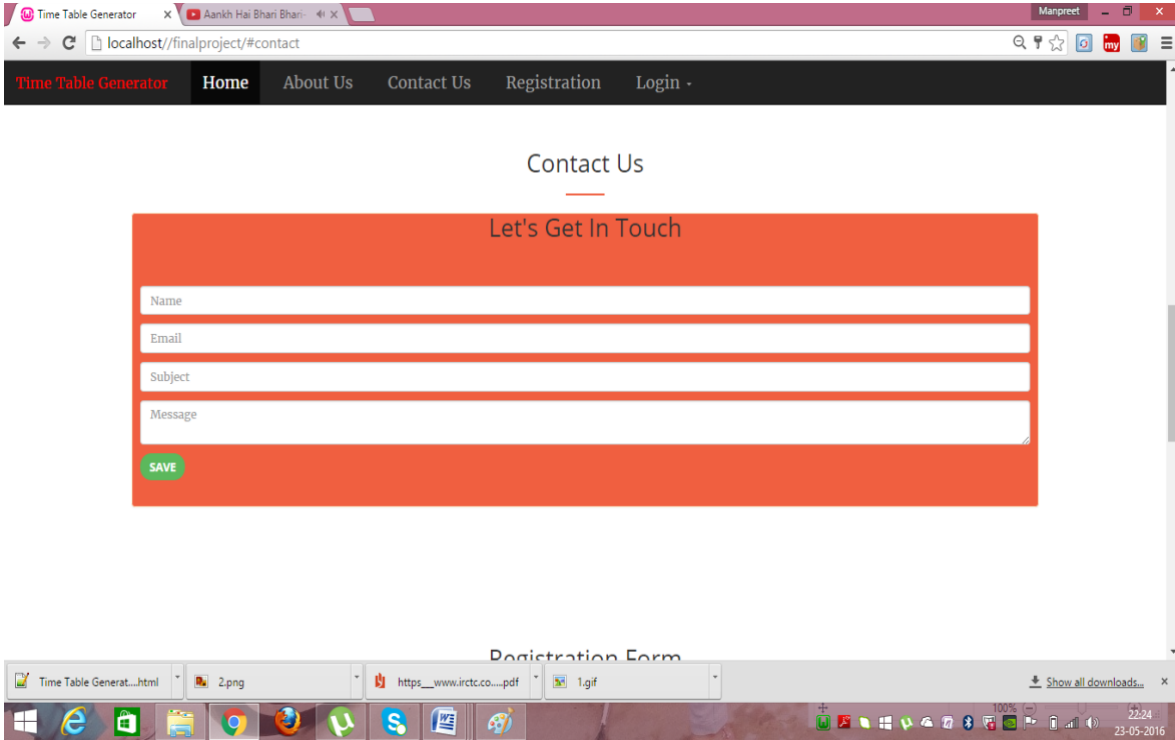
**Home Page:** This is the Main Page of the project 'Time Table Generator'.



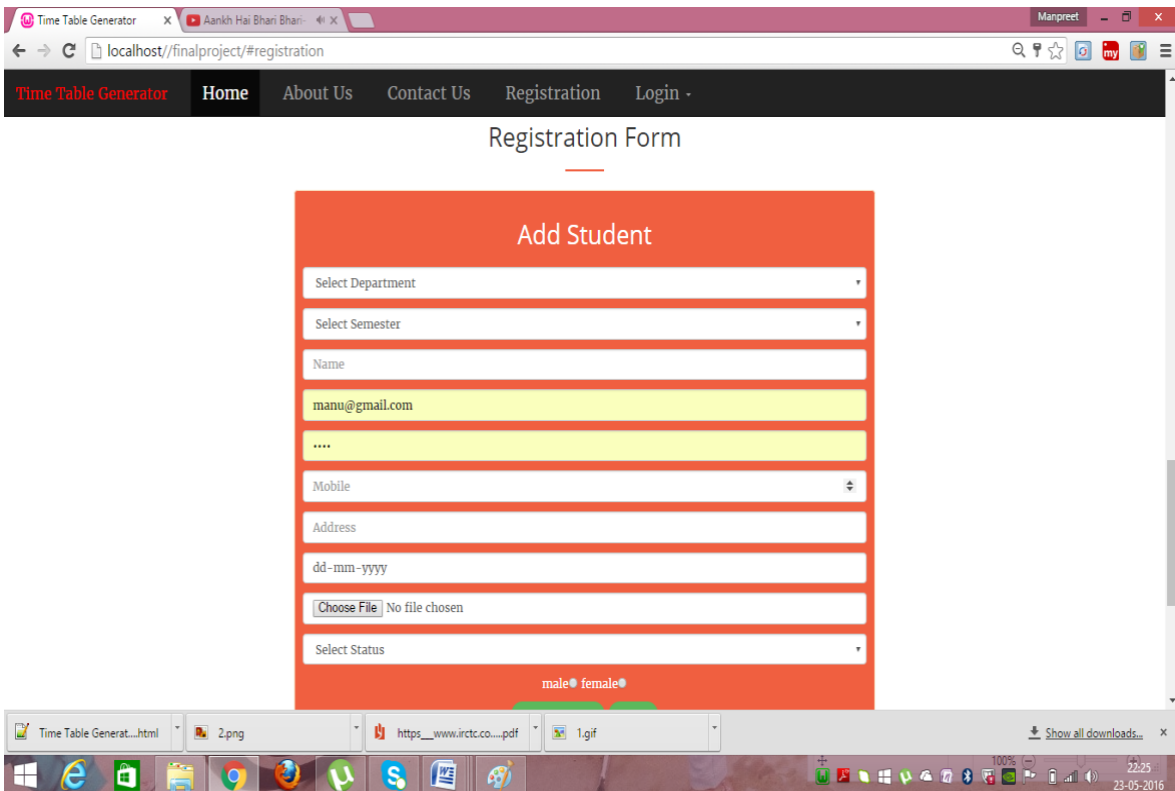
## About Us Page:



## Contact Us Page:



## Registration Form:



## Conclusion/Future Enhancement:

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.

The major benefit of this project is to store information at one place and it can be accessed via online transaction. Instead of tedious paper work, students can view the timetable with a quick turnaround. This system is user friendly and provides faster and better generation of timetable, which in turn saves time. There are few points that justify the need of this system:

- user friendly
- faster and better generation of timetable
- Saving time and manpower.

Time Table Generator is a convenient time table managing website. Time table management may be aided by a range of skills, tools, and techniques used to manage time table when accomplishing specific subjects, semesters, and students. Initially, time table management referred to just work activities, but eventually the term broadened to include personal activities as well. A time table management system is a designed combination of processes, tools, techniques, and methods. Timetable management is usually a necessity in project development as it determines the project completion time and scope.

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