BaKaPlan

Project Report

Submitted for partial fulfilment of the Degree
of
Bachelor of Technology
(Information Technology)
Batch:2009-2013

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BaKaPlan

Acknowledgement

The authors are highly grateful to the Dr. M.S. Saini (Director, Guru Nanak Dev Engineering College, Ludhiana), for providing this opportunity to carry out the six month industrial training at Testing and Consultancy Cell, Guru Nanak Dev Engineering College, Ludhiana.

The constant guidance and encouragement received from Er. K. S. Mann Dean T&P, GNDEC Ludhiana has been of great help in carrying out the project work and is acknowledged with reverential thanks.

The authors would like to express a deep sense of gratitude and thanks profusely to Dr. H.S Rai (Dean, Testing and Consultancy Cell, Guru Nanak Dev Engineering College, Ludhiana). Without the wise counsel and able guidance, it would have been impossible to complete the report in this manner.

The author express gratitude to other faculty members of Information Technology department of GNDEC for their intellectual support throughout the course of this work.

Finally, the authors are indebted to all whosoever have contributed in this report work with Taranjeet Singh(D4 IT), Avneet Kaur(D4 IT), Vigas Deep(D4 IT). Without their encouragement it would not have been possible to complete this project in such an efficient manner.

Mandeep Kaur

I

Abstract

BaKaPlan is an application or software which generate seating plan examination, concerts, autitoriam, stadiums, etc. It is an application which generate seting plan automatically. It is used for generating seating plan for examination, conferences, universities, stadiums, etc. C++ and CGI (Common Gateway Interface) languages are used in BaKaPlan.

BaKaPln has five strategies: Cushy, Flip Flop, Triplet, Quadlet, serpentine. Each strategy has its own requirements. Cushy is used when their is no hard exam or when their is less seats for generating seating plan.

BaKaPlan is divided into two sections - Front end and Backend. CGI and C++ is used to create frontend for BaKaplan. User will fill class, room, roll no and datesheet detail through browser then it is processed by c++ program and respective input files are created. MySQL is used to handle database. The project details are stored in database. MySQL C++ Connector is used for connectivity between database and C++.

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1 Introduction To Organisation

I had my Six Weeks Institutional Training at TCC(Testing And Consultancy Cell), GNDEC Ludhiana. Guru Nanak Dev Engineering College was established by the Nankana Sahib Education Trust (NSET) Ludhiana. The Nankana Sahib Education Trust(NSET) was founded in memory of the most sacred temple of Sri Nankana Sahib, birth place of Sri Guru Nanak Dev Ji. With the mission of Removal of Economic Backwardness through Technology Shiromani Gurudwara Parbandhak Committee (SGPC) started a Poly technical was started in 1953 and Guru Nanak Dev Engineering College was established in 1956.

NSET resolved to uplift Rural areas by admitting 70% of students from these rural areas ever year. This commitment was made to nation on 8th April, 1956, the day foundation stone of the college building was laid by Dr. Rajendra Prasad Ji, the First President of India. The College is now ISO 9001:2000 certified.

Figure 1: Guru Nanak Dev Engineering College

Guru Nanak Dev Engineering College campus is spread over 88 acres of prime land about 5 Km s from Bus Stand and 8 Km s from Ludhiana Railway Station on Ludhiana-Malerkotla Road. The college campus is well planned with beautifully laid out tree plantation, pathways, flowerbeds besides the well maintained sprawling lawns all around. It has beautiful building for College,Hostels,Swimming Pool,Sports and Gymnasium Hall Complex, Gurudwara Sahib, Bank, Dispensary, Post Office etc. There are two hostels for boys and one for girls with total accommodation of about 550 students. The main goal of this institute is:

- To build and promote teams of experts in the upcoming specialisations.

- To promote quality research and undertake research projects keeping in view their relevance to needs and requirements of technology in local industry.

- To achieve total financial independence.

1.1 Testing and Consutancy Cell

My Six Weeks Institutional Training was done by me at TCC (Testing And Consultancy Cell), GNDEC Ludhiana under the guidance of Dr. H.S.Rai (Dean Testing and Consultancy Cell). Testing and Consultancy Cell was established in the year 1979 with a basic aim to produce quality service for technical problems at reasonable and affordable rates as a service to society in general and Engineering fraternity in particular.

Figure 2: Testing and Consultancy Cell

Consultancy Services are being rendered by various Departments of the College to the industry, Sate Government Departments and Entrepreneurs and are extended in the form of expert advice in design, testing of materials & equipment, technical surveys, technical audit, calibration of instruments, preparation of technical feasibility reports etc. This consultancy cell of the college has given a new dimension to the development programmers of the College. Consultancy projects of over Rs. one crore are completed by the Consultancy cell during financial year 2009-10.

Ours is a pioneer institute providing Consultancy Services in the States of Punjab, Haryana, Himachal, J&K and Rajasthan. Various Major Clients of the Consultancy Cell are as under:

- Larson & Turbo.

- Multi National Companies like AFCON & PAULINGS.

- Power Grid Corporation of India.

- National Building Construction Co.

- Punjab State Electricity Board.

- Punjab Mandi Board.

- Punjab Police Housing Corporation.

- National Fertilizers Ltd.

- PUNSUP

- Postal & Telecom Department, Govt. of India.

2   LATEX

2.1   Introduction to LATEX

LATEX, I had never heard about this term before doing this project, but when I came to know about it's features, it is just excellent. LATEX(pronounced /letk/, /letx/, /ltx/, or /ltk/) is a document markup language and document preparation system for the TEX typesetting program. Within the typesetting system, its name is styled as LATEX.

Figure 3: Donald Knuth, Inventor Of TEX typesetting system

Within the typesetting system, its name is styled as LATEX. The term LATEX refers only to the language in which documents are written, not to the editor used to write those documents. In order to create a document in LATEX, a .tex file must be created using some form of text editor. While most text editors can be used to create a LATEX document, a number of editors have been created specifically for working with LATEX.

LATEX is most widely used by mathematicians, scientists, engineers, philosophers, linguists, economists and other scholars in academia. As a primary or intermediate format, e.g., translating DocBook and other XML-based formats to PDF, LATEX is used because of the high quality of typesetting achievable by TEX. The typesetting system offers programmable desktop publishing features and extensive facilities for automating most aspects of typesetting and desktop publishing, including numbering and cross-referencing, tables and figures, page layout and bibliographies.

LATEX is intended to provide a high-level language that accesses the power of TEX. LATEX essentially comprises a collection of TEX macros and a program to process LATEXdocuments. Because the TEX formatting commands are very low-level, it is usually much simpler for end-users to use LATEX.

2.2   Typesetting

LATEX is based on the idea that authors should be able to focus on the content of what they are writing without being distracted by its visual presentation. in preparing a LATEX document, the author specifies the logical structure using familiar concepts such as chapter, section, table, figure, etc., and lets the LATEX system worry about the presentation of these structures. it therefore encourages the separation of layout from content while still allowing manual typesetting adjustments where needed.

```
\documentclass[12pt]{article}
\usepackage{amsmath}
\title{\LaTeX}
\date{}
\begin{document}
  \maketitle
  \LaTeX{} is a document preparation system
  for the \TeX{} typesetting program.
   \par
   $E=mc^2$
\end{document}
```

3   Project Preview

Seating Plan for examination is a structure in which seats are alloced to students for examination. It is donr in such a way that no student do cheating in examination. Seating Plan can be done for any other purpose like for stadium, conference or auditoriums.

3.1   The Existing System

Earlier the seats allocation for examination was done manually. There was no program or application which can allow user to do work automatically just by providing details like roll numbers, room details, branches information and subject informations.

Limitations of current system

- It's difficult to arrange rooms according to seating plan.

- It is difficult to find total number of rooms and students as sometimes manuall calculations were wrong and result in less no of seats for seating plan.

- There are many chances of the mistakes like double allocation of same roll numbers or missing some roll numbers throughout the manual work.

- It's difficult to handle many methods or strategies.

- It does not tell us in advance weather a strategy is valid or not.

- Difficult to create seating plan for large numbers of rooms and strudents.

- Manual work is inefficient.

- It's time consuming.

3.2   Objective of Proposed System

The manual system has some drawbacks which can be overcome by using the computerized application to allocate the seats for examination. Main objective is to generate seating automatically and error free.

- It will become easy to generate seating plan for large halls, autditoriums.

- It will check maximum seats required for seating plan according to total students.

- To remove duplicacy of seats allocated to same person.

- It is web based. So it's easy to user fill details and user friendly.

- It will provide different strategies for generating seating plan.

- It can be used anywhere.

- It is efficient and less time consuming.

- Provide database to re-generate existing seating plan.

4 My Project

4.1 Introduction to BaKaPlan

BaKaPlan is a **Baithne Ka Plan**. It is an application which generate seting plan automatically. It is used for generating seating plan for examination, conferences, universities, stadiums, etc. C++ and CGI (Common Gateway Interface) languages are used in BaKaPlan.

BaKaPlan is divided into two sections:

- **Frontend**: CGI and C++ is used to create frontend for BaKaplan. User will fill class, room, roll no and datesheet detail through browser then it is processed by c++ program and respective input files are created.

- **Backend**: MySQL is used to handle database. The project details are stored in database. MySQL C++ Connector is used for connectivity between database and C++.

4.2 Modules

- **Login and Registration**: User has to register for generating seating plan. When user do registeration, he/she will get email to confirm email id. jwSMTP is used for sending mails to users.

- **Input Module**: User will fill all input details through browser and then input files are created as well as data is stored in MySQL database.

- **Intermediate Module**: In this section, c++ programs are executed in backend to generate seating plan. Validation for selected strategy is done to check total seats. If seats for generating seating plan is less then user has to fill extra rooms. Each strategy has is own check for total seats.

- **Output Module**: In this module, generated seating plan is written in files. From files, file HTML file for generated seating plan.

4.3 Strategies

BaKaPlan has five different strategies. Each strategy has its own requirements, advantages and disadvantages. One should choose strategy according to its need and requirement.

List of strategies are as folows:

- Cushy

- Serpentime

- Flip-Flop

- Triplet

- Quadlet

4.3.1 Cushy

Cushy means easy. This is the simplest strategy. In this strategy, seating plan is done continuously. For example, seating plan is done by allocating all roll nos. of first subject code then continuous with 2nd subject code and so on.

Requirement

- Minimum 1 Class/Branch with minimum 1 subject code.

When to use

- When there is only one subject code.

- If examination has multiple sets of subjects.

- If seats in examination has more space between them.

- When there are equal seats with total students means there are no more extra rooms/seats.

- When only there is only one class for seating plan.

When not to use

- When there is any entrance examination.

- When there is no sets/codes for subjects.

Figure 4: Cushy

4.3.2 Serpentine

Serpentime is the simplest strategy. In this strategy, seating plan is done continuously. For example, seating plan is done by allocating all roll nos. of first subject code then continuous with 2nd subject code and so on.

Requirement

- Minimum 1 Class/Branch with minimum 1 subject code.

When to use

- When there is only one subject code.

- If examination has multiple sets of subjects.

- If seats in examination has more space between them.

- When there are equal seats with total students means there are no more extra rooms/seats.

- When only there is only one class for seating plan.

When not to use

- When there is any entrance examination.
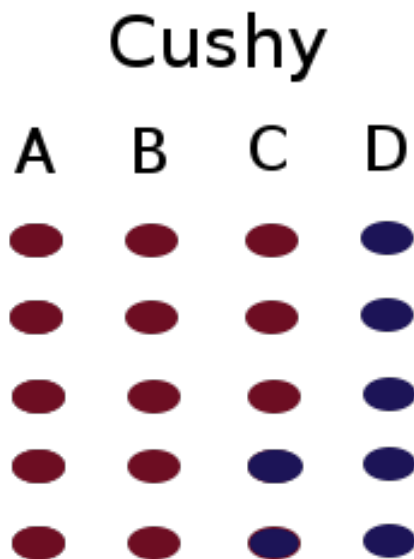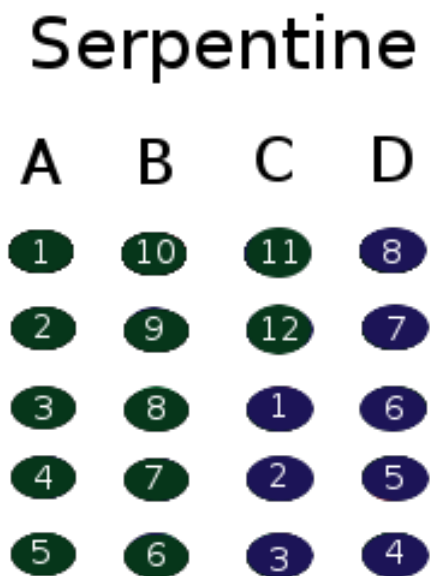
- When there is no sets/codes for subjects.

Figure 5: Serpentine

4.3.3   Flip Flop

Flip Flop is the second strategy. In this strategy, seating plan is done by mixing two subject codes i.e. 1st subject code, 2nd subject code, 1st subject code and so on.

Requirement

- Minimum 2 classes or 1 class with 2 subject codes.

When to use

- When there are minimum 2 subject codes.

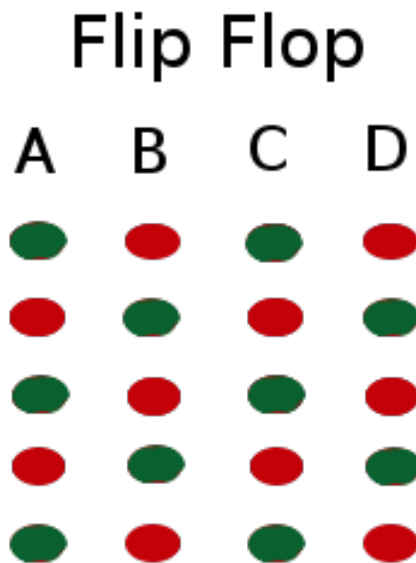- When there is only one set for each subject in examination.

Figure 6: Flip Flop

4.3.4   Triplet

Triplet means combination of three subject codes. Their is no seating plan with continuous subject code.

Requirement

- Minimum 3 classes with 1 subject each or minimum 3 subject codes.

- Must have extra rooms if required.

When to use

- When there are not sets or different codes for same subject code.

- When there are minimum three classes.

- When extra rooms are available.

Figure 7: Triplet

4.3.5 Quadlet

Quadlet means combination of four subject codes. It is used whem heir is no seating plan with continuous subject code.

Requrement

- Minimum four classes with 1 subject each or minimum 3 subject codes.

- Must have extra rooms if required.

When to use

- When there are not sets or different codes for same subject code.

- When there are minimum four classes.
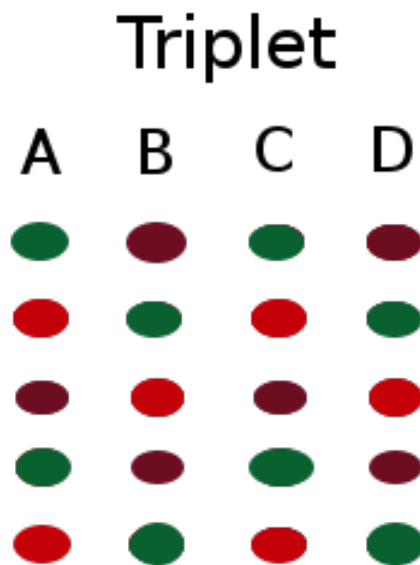
- When extra rooms are available.

- For entrance test.

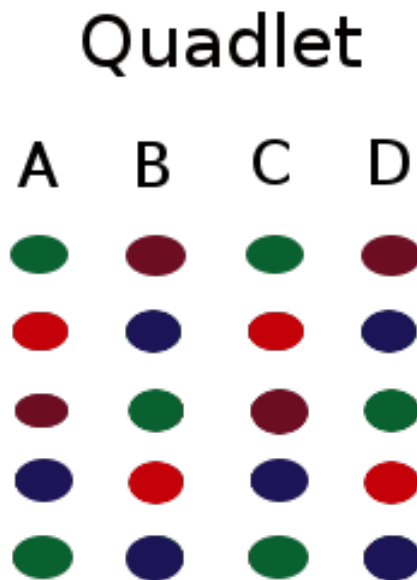- When their is less distance between rows and columns.

Figure 8: Quadlet

4.4   Product Definition

Feasibility Analysis : Feasibility analysis aims to uncover the strengths and weaknesses of a project. In its simplest term, the two criteria to judge feasibility are cost required and value to be attained. As such, a well-designed feasibility analysis should provide a historical background of the project, description of the project or service, details of the operations and management and legal requirements. Generally, feasibility analysis precedes technical development and project implementation. There is some feasibility factors by which we can determine that project is feasible or not:

- **Technical feasibility** : Technological feasibility is carried out to determine whether the project has the capability, in terms of software, hardware, personnel to handle and fulfill the user requirements. The assessment is based on an outline design of system requirements in terms of Input, Processes, Output and Procedures. BaKaPlan is technically feasible as it is built up in Open Source Environment and thus it can be run on any Open Source platform.

- **Economic feasibility** : Economic analysis is the most frequently used method to determine the cost/benefit factor for evaluating the effectiveness of a new system. In this analysis we determine whether the benefit is gain according to the cost invested to develop the project or not. If benefits outweigh costs, only then the decision is made to design and implement the system. It is important to identify cost and benefit factors, which can be categorized as follows:
  1. Development costs; and
  2. Operating costs.
  BaKaPlan is also Economically feasible with 0 Development and Operating Charges as it is developed in C++ language using CGI which is FOSS technology and the software is operated on Open Source platform.

- **Legal feasibility** : In this type of feasibility study we basically determines whether the project conflicts with legal requirements, e.g. a data processing system must comply with the local Data Protection Acts. But BaKaPlan Software has been developed for automating seating plan process with properly Licensed technologies. Thus is the legal process.

- **Operational feasibility** : Operational feasibility is a measure of how well a project solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development. All the Operations performed in the software are very quick and satisfies all the reuirements.

- **Behavior Feasibility** : In this feasibility we check about the behavior of the proposed system software i.e. whether the proposed project is user friendly or not, whether users can use the project without any training because of the user friendliness or not. BaKaPlan is very user friendly as user interacts with it through web.

4.5   Software Requirement Analysis

A Software Requirements Analysis for a software system is a complete description of the behavior of a system to be developed. It includes a set of use cases that describe all the interactions the users will have with the software. In addition to use cases, the SRS also contains non-functional requirements. Non-functional requirements are requirements which impose constraints on the design or implementation.

Purpose : BaKaPlan is a web based software and the main purpose of this project is to:

- Allocate seats automatically.

- Proide user interface to generate seating plan.

- Automatic checking of no. of seats and total students.

- Reduce the dependencies between people involved with the process.

- Increasing the transparency.

- Provide five different strategies for generating seating plan.

4.5.1   Hardware Requirement

Processor:	Dual core
Speed:	2 GHz
RAM:	250 MB
Hard Disk:	30 GB

4.5.2   Software Requirement

Platform	Linux/windowsXP/7
Operating System	Ubuntu12.04
Front-End Tool	CGI with C++
Back-End Tool	MySQL Server
C++ Compiler	GNU G++
Connector for C++	MySQL Connector/C++
CGI Library	GNU CGICC Library
For Sending mail	jwSMTP Library

4.6   Introduction to Object Oriented Programming

Object-oriented programming (OOP) is a programming paradigm using "objects" usually instances of a class consisting of data fields and methods together with their interactions to design applications and computer programs. Programming techniques may include features such as data abstraction, encapsulation, messaging, modularity, polymorphism, and inheritance. Many modern programming languages now support forms of OOP, at least as an option.

An object-oriented program may be viewed as a collection of interacting objects, as opposed to the conventional model, in which a program is seen as a list of tasks (subroutines) to perform. In OOP, each object is capable of receiving messages, processing data, and sending messages to other objects. Each object can be viewed as an independent "machine" with a distinct role or responsibility. The actions (or "methods") on these objects are closely associated with the object. For example, OOP data structures tend to "carry their own operators around with them".

The terms "objects" and "oriented" in something like the modern sense of object-oriented programming seem to make their first appearance at MIT in the late 1950s and early 1960s.

4.6.1   Features of OOPs

- OPPs abbreviated as an Object Oriented Programming Language.

- Object Oriented Programming (OOP) is a Programming methodology that uses object to design applications and computer programs.

- Object-Oriented Programming (OOP) is a software development paradigm that suggests developers to split a program in building blocks known as objects. The OOP paradigm allows developers to define the object's data,functions, and its relationship with other objects.

- It utilizes various techniques from previously established paradigms including Inheritance, Polymorphism and Encapsulation.

- The ability to define a class and create instances of classes is one of the most important capabilities of any Object Oriented Programming.

4.6.2   Object

- In everyday life, an object is anything that is identifiably a single material item i.e. a Car, a book, a document etc.

- In technical language Object is called as a instance of class.

- Objects are key understanding of Object oriented programming.

- In other words, break each program into lots of units and design each unit to perform a clearly specified role within the pro

4.6.3 Class

- A Class is a Blueprint from which individual objects are created.

- In OOP you program a class as a template for a specific object or groups of objects that will always have the same features.

4.6.4 Encapsulation

Encapsulation is an Object Oriented Programming concept that binds together the data and functions that manipulate the data, and that keeps both safe from outside interference and misuse. Data encapsulation led to the important OOP concept of data hiding. Data encapsulation is a mechanism of bundling the data, and the functions that use them and data abstraction is a mechanism of exposing only the interfaces and hiding the implementation details from the user. Neither too much access nor too much control must be placed on the operations in order to make the class user friendly. Hiding the implementation details and providing restrictive access leads to the concept of abstract data type. Encapsulation leads to the concept of data hiding.[3]

4.6.5 Inheritance

In object-oriented programming (OOP), inheritance is a way to reuse code of existing objects, or to establish a subtype from an existing object, or both, depending upon programming language support. In classical inheritance where objects are defined by classes, classes can inherit attributes and behavior from pre-existing classes called base classes, super classes, parent classes or ancestor classes. The resulting classes are known as derived classes, subclasses or child classes. The relationships of classes through inheritance gives rise to a hierarchy. In prototype-based programming, objects can be defined directly from other objects without the need to define any classes, in which case this feature is called differential inheritance. The figure1 shows the inheritance as:
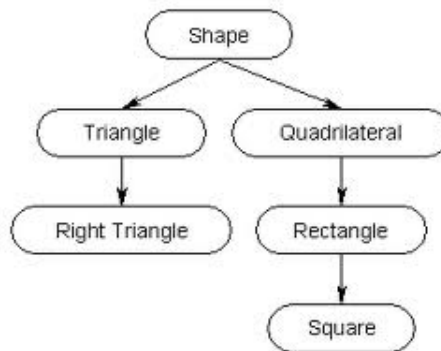

Figure 9: Inheritance example

4.6.6 Data Hiding

- Data Hiding is also known as Encapsulation.

- Encapsulation is the process of combining data and function into a single unit called class.

- Data Hiding is the mechanism where the details of the class are hidden from the user.

- The user can perform only a restricted set of operations in the hidden member of the class.

- Encapsulation is a powerful feature that leads to information hiding,abstract data type and friend function.

- They encapsulate all the essential properties of the object that are to be created.

- Using the method of encapsulation the programmer cannot directly access the class.

It provides the following features:

- The advantage of data encapsulation comes when the implementation of the class changes but the interface remains the same.

- It is used to reduce the human errors. The data and function are bundled inside the class that take total control of maintenance and thus human errors are reduced.

- Makes maintenance of application easier.

- Improves the understandability of the application.

- Enhanced Security.

4.7 Introduction to C++

C++ (pronounced "see plus plus") is a statically typed, free-form, multi-paradigm, compiled, general-purpose programming language. It is regarded as an intermediate-level language, as it comprises a combination of both high-level and low-level language features. Developed by Bjarne Stroustrup starting in 1979 at Bell Labs, it adds object oriented features, such as classes, and other enhancements to the C programming language. Originally named C with Classes, the language was renamed C++ in 1983,as a pun involving the increment operator.
C++ is one of the most popular programming languages and is implemented on a wide variety of hardware and operating system platforms. As an efficient compiler to native code, its application domains include systems software, application software, device drivers, embedded software, high-performance server and client applications, and entertainment software such as video games.Several groups provide both free and proprietary C++ compiler software.
C++ is the multi paradigm, compile, free form , general purpose, statistically typed programming language. This is known as middle level language as it comprises of low level and high level language features. And there are some other things and advantages of this language over the C. This language of invented by Bjarne Stroustrup was working on the C with classes as his Ph.D. topic. The first commercial implementation of the C++ was released in 1985 and before that the name of language was changed to C++. And some new features were added to the language and The main features of the C++ are

- Classes

- Inheritance

- Data abstraction and encapsulation

- Polymorphism

- Dynamic Binding

- Message Passing

Here is a brief description of each features.

- **Classes:**By using classes we can create user defined data types. In other words the class is the collection of set of data and code. The class allows us to do some things which are polymorphism, inheritance, abstraction, encapsulation which are our next features. The objects are the instances of classes. The syntax for class is : Class ¡class-name¿ //Body of class; ;

- **Inheritance:** Inheritance allows one data type to acquire properties of other data types. Inheritance from a base class may be declared as public, protected, or private. If the access specifier is omitted, a class inherits privately, while a struct inherits publicly. This provides the idea of reusability that means we can add the new features to an existing class without modifying it.

- **Data Abstraction and Encapsulation:** Encapsulation means hiding of data from the data structures or in other words wrapping up of data in single entity is known as Encapsulation. In this the data is not accessible to outside world and only the functions are allowed to access it. When we want to write the class in which we dont have the knowledge about the arguments used to instantiate it then we can use templates in C++. Abstraction can be defined as the act of representing essential features without including background details.[5]

- **Polymorphism:** It means that the one interface can be used for many implementation so that object can behave differently for each implementation. The different types of polymorphism are static (Compile time) and dynamic (Run time).

- **Dynamic Binding:** It means that the linking of a procedure call to code to be executed in response to the call. A function call associated with a polymorphic reference depends on the dynamic type that reference. And at run-time the code matching the object under current reference will be called.

- **Message Passing:** An object oriented program consists of the set of objects that communicate with each other. objects communicate with one another by sending and receiving information much the same way as people pass messages to one another. The concept of message passing makes it easier to direct model or simulate their real world counterparts.

4.8 MySQL Database Server

MySQL, the most popular Open Source SQL database management system, is developed, distributed, and supported by Oracle Corporation. It is based on the structure query language (SQL), which is used for adding, removing, and modifying information in the database. Standard SQL commands, such as ADD, DROP, INSERT, and UPDATE can be used with MySQL.

MySQL can be used for a variety of applications, but is most commonly found on Web servers. A website that uses MySQL may include Web pages that access information from a database. These pages are often referred to as "dynamic," meaning the content of each page is generated from a database as the page loads. Websites that use dynamic Web pages are often referred to as database-driven websites.

- **MySQL is a database management system.**
  A database is a structured collection of data. It may be anything from a simple shopping list to a picture gallery or the vast amounts of information in a corporate network. To add, access, and process data stored in a computer database, you need a database management system such as MySQL Server. Since computers are very good at handling large amounts of data, database management systems play a central role in computing, as standalone utilities, or as parts of other applications.

- **MySQL databases are relational.**
  A relational database stores data in separate tables rather than putting all the data in one big storeroom. The database structures are organized into physical files optimized for speed. The logical model, with objects such as databases, tables, views, rows, and columns, offers a flexible programming environment. You set up rules governing the relationships between different data fields, such as one-to-one, one-to-many, unique, required or optional, and pointers between different tables.

- **MySQL software is Open Source.**
  Open Source means that it is possible for anyone to use and modify the software. Anybody can download the MySQL software from the Internet and use it without paying anything. If you wish, you may study the source code and change it to suit your needs. The MySQL software uses the GPL (GNU General Public License).

- **The MySQL Database Server is very fast, reliable, scalable, and easy to use.**
  If that is what you are looking for, you should give it a try. MySQL Server can run comfortably on a desktop or laptop, alongside your other applications, web servers, and so on, requiring little or no attention.

4.9 Apache Web Server

Apache HTTP Server, commonly referred to as Apache (/pti/ -PA-chee), is a web server software notable for playing a key role in the initial growth of the World Wide Web. Apache is developed and maintained by an open community of developers under the auspices of the Apache Software Foundation. The application is available for a wide variety of operating systems, including Unix, FreeBSD, Linux, Solaris, Novell NetWare, OS X, Microsoft Windows, OS/2, TPF, and eComStation. Released under the Apache License, Apache is open-source software.

The goal of this project is to provide a secure, efficient and extensible server that provides HTTP services in sync with the current HTTP standards.

Following are main features of Apache Server:

- Apache supports a variety of features, many implemented as compiled modules which extend the core functionality. These can range from server-side programming language support to authentication schemes. Some common language interfaces support Perl, Python, Tcl, and PHP. Popular authentication modules include mod access, mod auth, mod digest, and mod auth digest, the successor to mod digest. A sample of other features include Secure Sockets Layer and Transport Layer Security support (mod ssl), a proxy module (mod proxy), a URL rewriter (mod rewrite), custom log files (mod log config), and filtering support (mod include and mod ext filter).

- Apache features configurable error messages, DBMS-based authentication databases, and content negotiation. It is also supported by several graphical user interfaces (GUIs).

- It supports password authentication and digital certificate authentication. Apache has a built in search engine and an HTML authorizing tool and supports FTP.

4.10   GNU G++ Compiler

The GNU Compiler Collection includes front ends for C, C++, Objective-C, Fortran, Java, Ada, and Go, as well as libraries for these languages (libstdc++, libgcj,...). GCC was originally written as the compiler for the GNU operating system. The GNU system was developed to be 100% free software, free in the sense that it respects the user's freedom.

We strive to provide regular, high quality releases, which we want to work well on a variety of native and cross targets (including GNU/Linux), and encourage everyone to contribute changes or help testing GCC. Our sources are readily and freely available via SVN and weekly snapshots.

Major decisions about GCC are made by the steering committee, guided by the mission statement.

You can invoke g++ on a source code file simply by typing
   g++ filename

The default executable output of g++ is "a.out". It is also possible to specify a name for the executable file at the command line by using the syntax
   -o outputfile

, as shown in the following example:
   g++ filename -o outputfile

4.11   Common Gateway Interface and C++

The Common Gateway Interface, or CGI, is a set of standards that define how information is exchanged between the web server and a custom script.The CGI specs are currently maintained by the NCSA and NCSA defines CGI is as follows:

- The Common Gateway Interface, or CGI, is a standard for external gateway programs to interface with information servers such as HTTP servers.

- The current version is CGI/1.1 and CGI/1.2 is under progress.

4.11.1   Web Browsing

To understand the concept of CGI, let's see what happens when we click a hyperlink to browse a particular web page or URL.

- Your browser contacts the HTTP web server and demand for the URL ie. filename.

- Web Server will parse the URL and will look for the filename. If it finds requested file then web server sends that file back to the browser otherwise sends an error message indicating that you have requested a wrong file.

- Web browser takes response from web server and displays either the received file or error message based on the received response.

4.11.2   CGI Architecture Diagram

The following simple program shows a simple architecture of CGI:
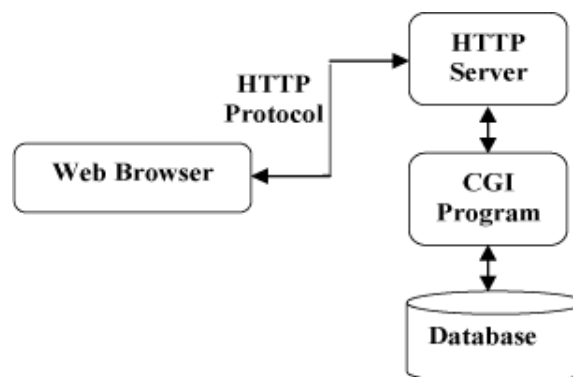
Figure 10: CGI Architecture

4.12 CGICC Library

GNU CGICC a C++ class library for writing CGI applications.

4.12.1 Introduction to GNU Cgicc

GNU cgicc is an ANSI C++ compliant class library that greatly simplifies the creation of CGI applications for the World Wide Web. cgicc performs the following functions:

- Parses both GET and POST form data transparently.

- Provides string, integer, floating-point and single- and multiple-choice retrieval methods for form data.

- Provides methods for saving and restoring CGI environments to aid in application debugging.

- Provides full on-the-fly HTML generation capabilities, with support for cookies.

- Supports HTTP file upload.

4.12.2 Requirements

GNU cgicc requires an ANSI-compliant C++ compiler supporting the C++ standard template library. cgicc is primarily developed on GNU/Linux using gcc version 3.3, but it has been built using the following compilers:

- gcc versions 2.8.1 and greater

- Hewlett-Packard aCC

- Microsoft Visual C++ 6.0

4.13   Make Utility

make - GNU make utility to maintain groups of programs.

The purpose of the make utility is to determine automatically which pieces of a large program need to be recompiled, and issue the commands to recompile them. The manual describes the GNU implementation of make, which was written by Richard Stallman and Roland McGrath. Our examples show C programs, since they are most common, but you can use make with any programming language whose compiler can be run with a shell command. In fact, make is not limited to programs. You can use it to describe any task where some files must be updated automatically from others whenever the others change.

To prepare to use make, you must write a file called the makefile that describes the relationships among files in your program, and the states the commands for updating each file. In a program, typically the executable file is updated from object files, which are in turn made by compiling source files.

Once a suitable makefile exists, each time you change some source files, this simple shell command:

    make

suffices to perform all necessary recompilations. The make program uses the makefile data base and the last-modification times of the files to decide which of the files need to be updated. For each of those files, it issues the commands recorded in the data base.

4.14   Boost Library

Boost provides free peer-reviewed portable C++ source libraries.

Boost libraries are intended to be widely useful, and usable across a broad spectrum of applications. The Boost license encourages both commercial and non-commercial use.

Most of the Boost libraries are licensed under the Boost Software License, designed to allow Boost to be used with both free and proprietary software projects. Many of Boost's founders are on the C++ standards committee, and several Boost libraries have been accepted for incorporation into both Technical Report 1 and the C++11 standard.

4.15   jwSMTP Library

jwSMTP is a C++ library/code (GPL license) to facilitate sending email programmatically. New in version 1.32.3 send mail in html format. All you need worry about is who the mail is from, who to send it to and the message itself, no network coding necessary. jwSMTP can send attachments, send to multiple recipients including BCC CC recipients. LOGIN & PLAIN SMTP authentication. Do an MX lookup or send direct via an smtp server.

Download the code above. uncompress the source code e.g:

```
tar -xvzf jwsmtp-<version>.tar.gz
```

This will extract all the files into the jwsmtp-¡version¿ directory, or use Winzip.
If you have Visual C++ double click the mail.dsw file in the main directory, this will open the project.
If you are using some flavor of unix type at the command line:

```
./configure
make
make install
```

4.16   Doxygen

Doxygen is the standard tool for generating documentation from annotated C++ sources, but it also supports other popular programming languages such as C, Objective-C, C#, PHP, Java, Python, IDL (Corba and Microsoft flavors), Fortran, VHDL, Tcl, and to some extent D.

4.16.1   Installation

Run following command in terminal:

```
$ sudo apt-get install doxygen
```

4.16.2   Usage

Its very simple to use. Just type $ doxygen in terminal and you got its manual.
To create documentation, move to folder where your source file exits through terminal and then type

```
$ cd /path/to/your/project/source/
$ doxygen -g [filename]
```

You can fill any filename as your choice. Its configuration file and you can edit that according your project details like change project name in filename.(config file for doxygen)
Then run

```
$ doxygen [filename]
```

By this your documentation will be generated. This will create 2 folders in your current directory.
Folders:

- **html** for html documentation open /path/to/project/source/html/index.html to check documentation.

- **latex** latex for documentation using latex as pdf output. For that file run

  ```
  $ cd /path/to/your/project/source/latex
  $ make
  ```

This will create refman.pdf file(check pdf file as file name may be changed in your case).
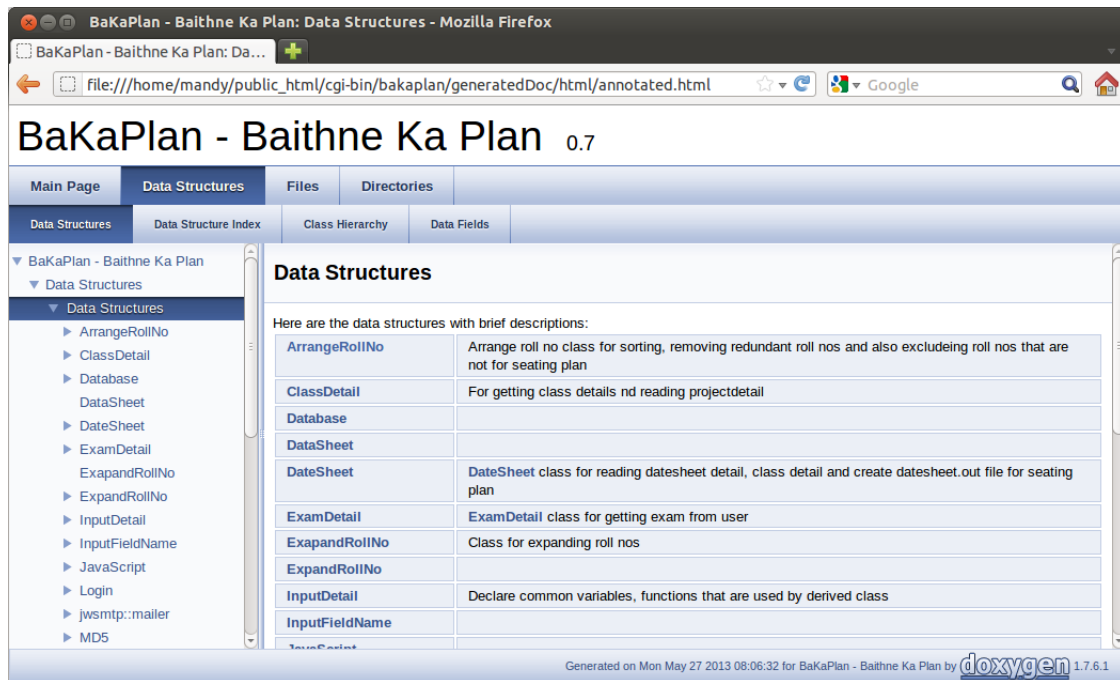
Figure 11: Doxygen Documentation
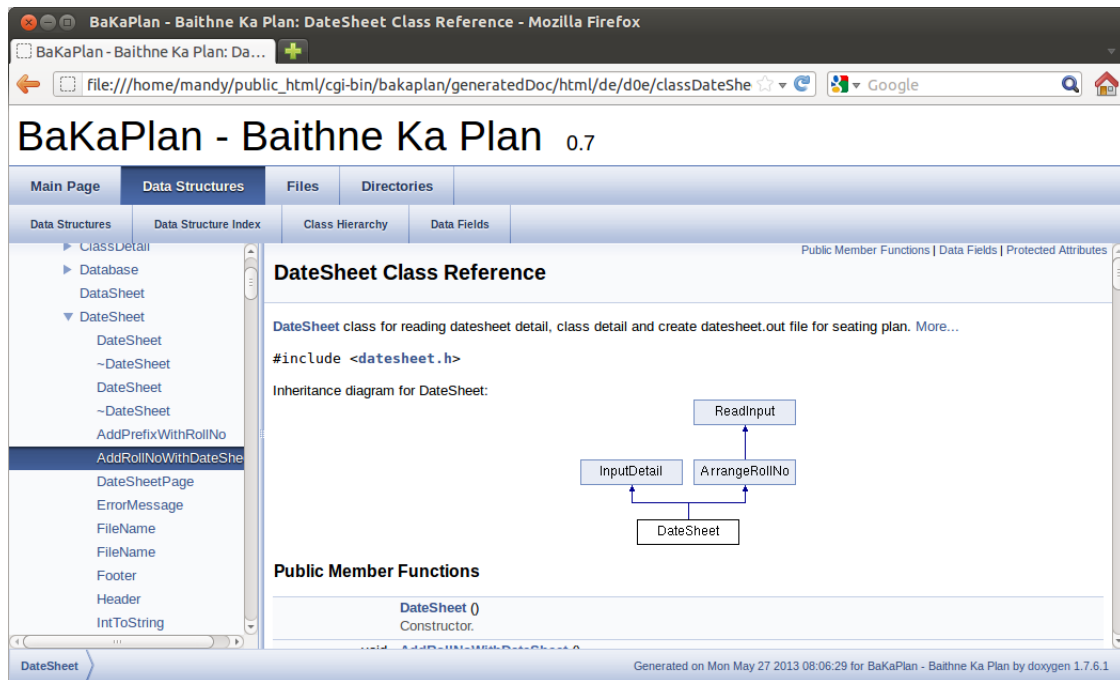
Figure 12: Class Hierarchy

4.17   GitHub

The Git feature that really makes it stand apart from nearly every other Source Code Management (SCM) out there is its branching model.

Git allows and encourages you to have multiple local branches that can be entirely independent of each other. The creation, merging, and deletion of those lines of development takes seconds.

This means that you can do things like:

- Frictionless Context Switching.
  Create a branch to try out an idea, commit a few times, switch back to where you branched from, apply a patch, switch back to where you are experimenting, and merge it in.

- Role-Based Codelines.
  Have a branch that always contains only what goes to production, another that you merge work into for testing, and several smaller ones for day to day work.

- Feature Based Workflow.
  Create new branches for each new feature you're working on so you can seamlessly switch back and forth between them, then delete each branch when that feature gets merged into your main line.

- Disposable Experimentation.
  Create a branch to experiment in, realize it's not going to work, and just delete it - abandoning the workwith nobody else ever seeing it (even if you've pushed other branches in the meantime).

Notably, when you push to a remote repository, you do not have to push all of your branches. You can choose to share just one of your branches, a few of them, or all of them. This tends to free people to try new ideas without worrying about having to plan how and when they are going to merge it in or share it with others.

There are ways to accomplish some of this with other systems, but the work involved is much more difficult and error-prone. Git makes this process incredibly easy and it changes the way most developers work when they learn it.

4.18 Design

System Design : Systems design is the process or art of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. One could see it as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering.

- External design: External design consists of conceiving, planning out and specifying the externally observable characteristics of the software product. These characteristics include user displays or user interface forms and the report formats, external data sources and the functional characteristics, performance requirements etc. External design begins during the analysis phase and continues into the design phase.

- Logical design: The logical design of a system pertains to an abstract representation of the data flows, inputs and outputs of the system. This is often conducted via modeling, which involves a simplistic (and sometimes graphical) representation of an actual system. In the context of systems design, modeling can undertake the following forms, including:

  - Data flow diagrams
  - Entity Relationship Diagrams

- Physical design: The physical design relates to the actual input and output processes of the system. This is laid down in terms of how data is input into a system, how it is verified/authenticated, how it is processed, and how it is displayed as output.

Design Notations:

Data Flow diagrams:
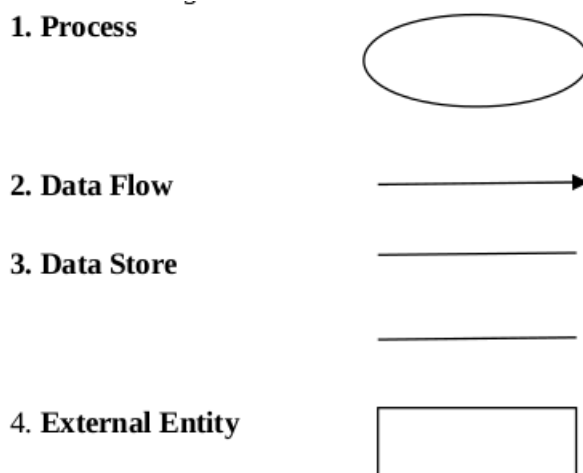
Figure 13: DFD Notation

Flow Charts:

1. Process

2. Data

3. Decision

4. Terminator

5. Connector
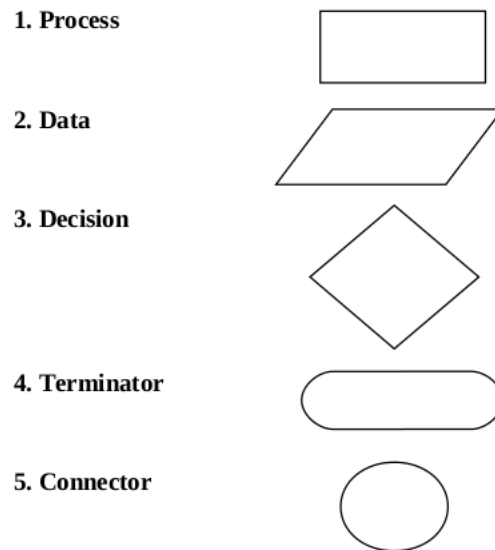
Figure 14: Flow Chart Notations

Detailed Design We basically describe the functionality of the system internally. The internal design describes how data is flowing from database to the user and how they both are internally connected. For this reason we can show the design of the system in detailed manner by many ways:

Flowchart A flowchart is a type of diagram that represents an algorithm or process, showing the steps as boxes of various kinds, and their order by connecting them with arrows. This diagrammatic representation can give a step-by-step solution to a given problem. Process operations are represented in these boxes, and arrows connecting them represent flow of control. Data flows are not typically represented in a flowchart, in contrast with data flow diagrams; rather, they are implied by the sequencing of operations. Flowcharts are used in analyzing, designing, documenting or managing a process or program in various fields

Database Design
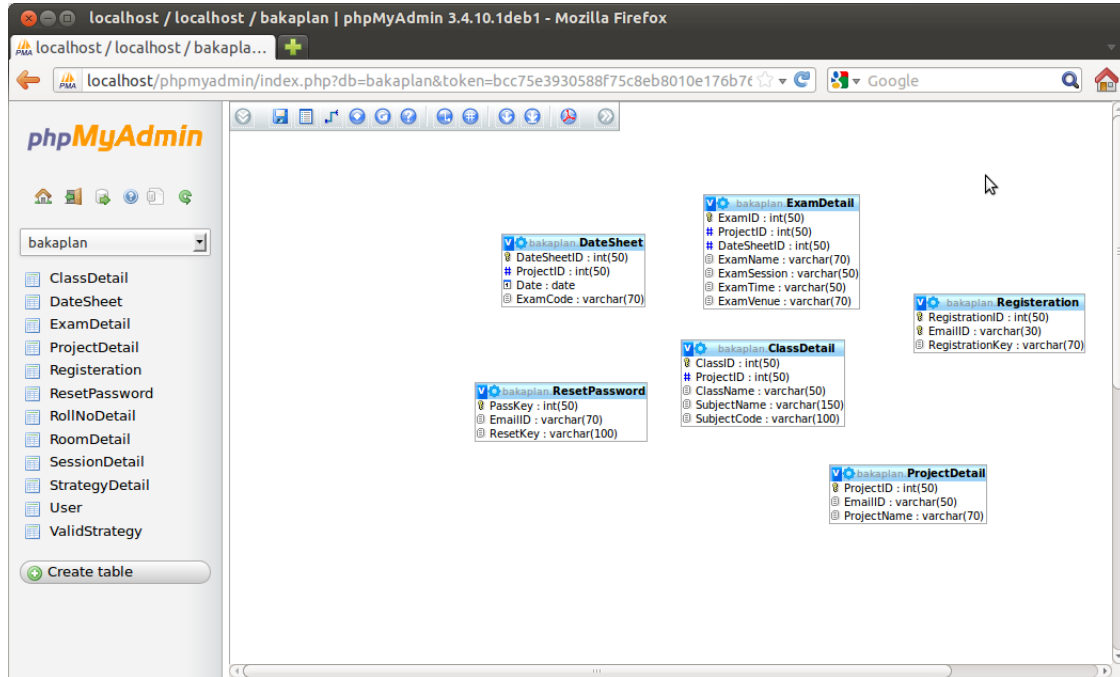
Figure 15: Database Design
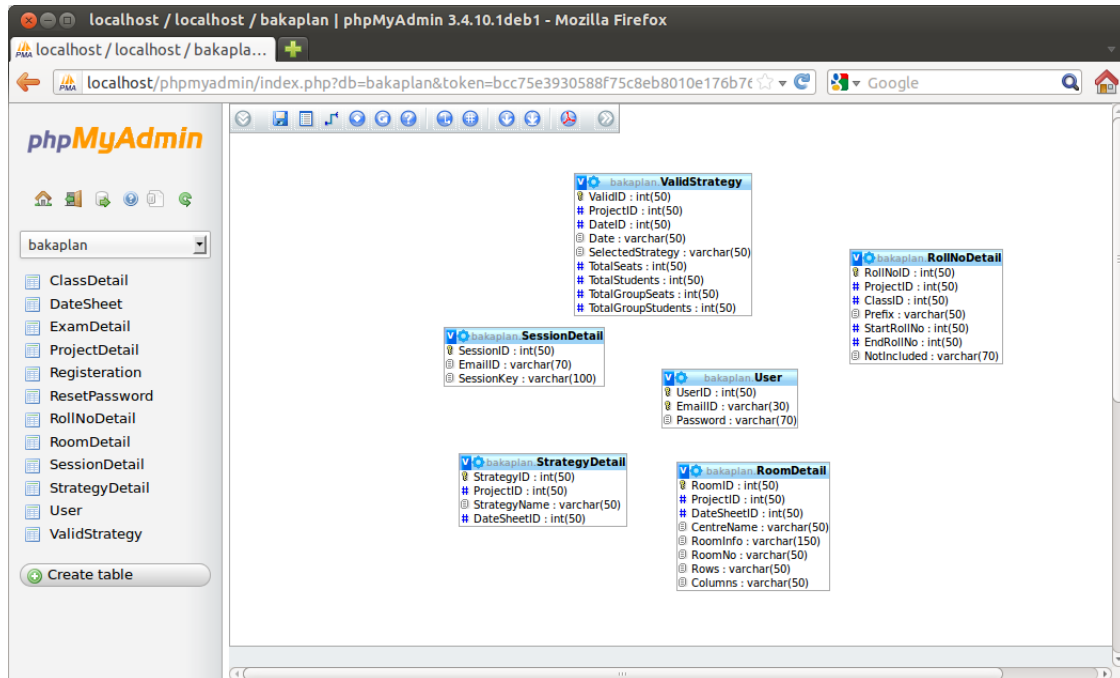
Figure 16: Database Design

4.19 Implementation of BaKaPlan

4.19.1 Login Interface
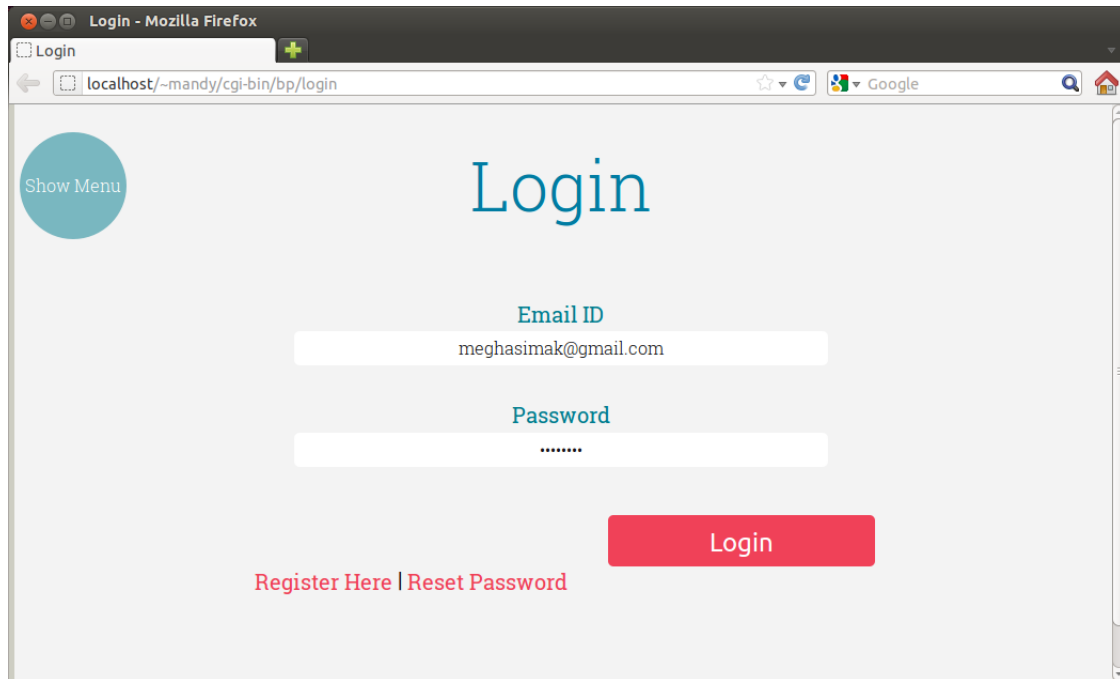
Figure 17: Login Interface

4.19.2   Project Detail
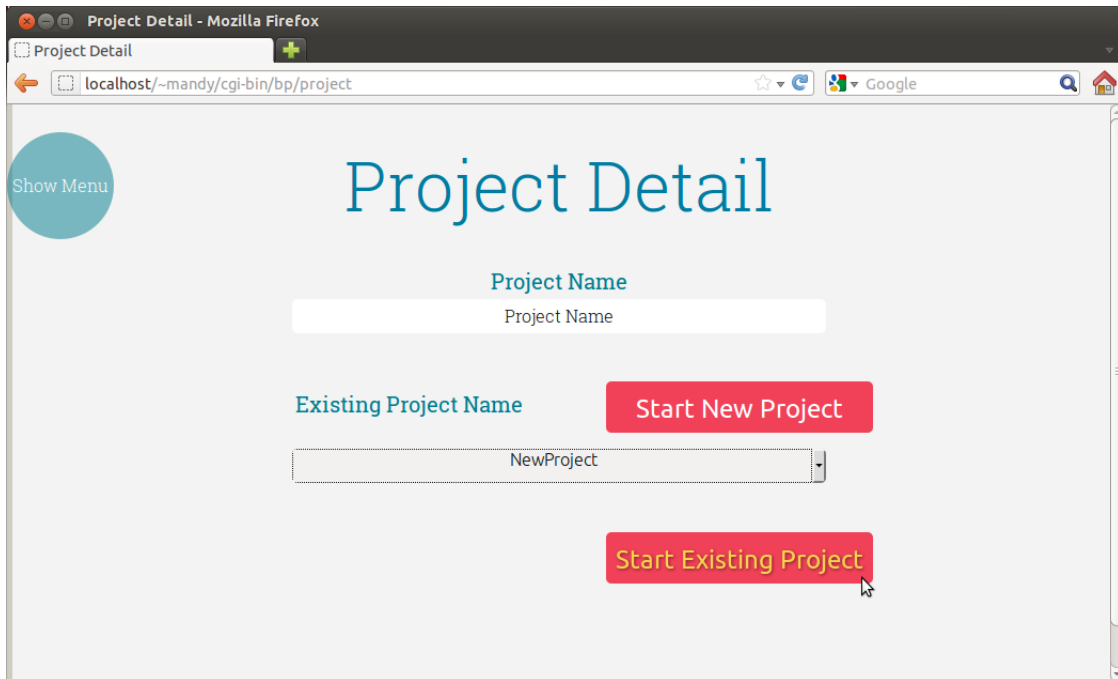
Figure 18: Project Detail

4.19.3   Class Detail
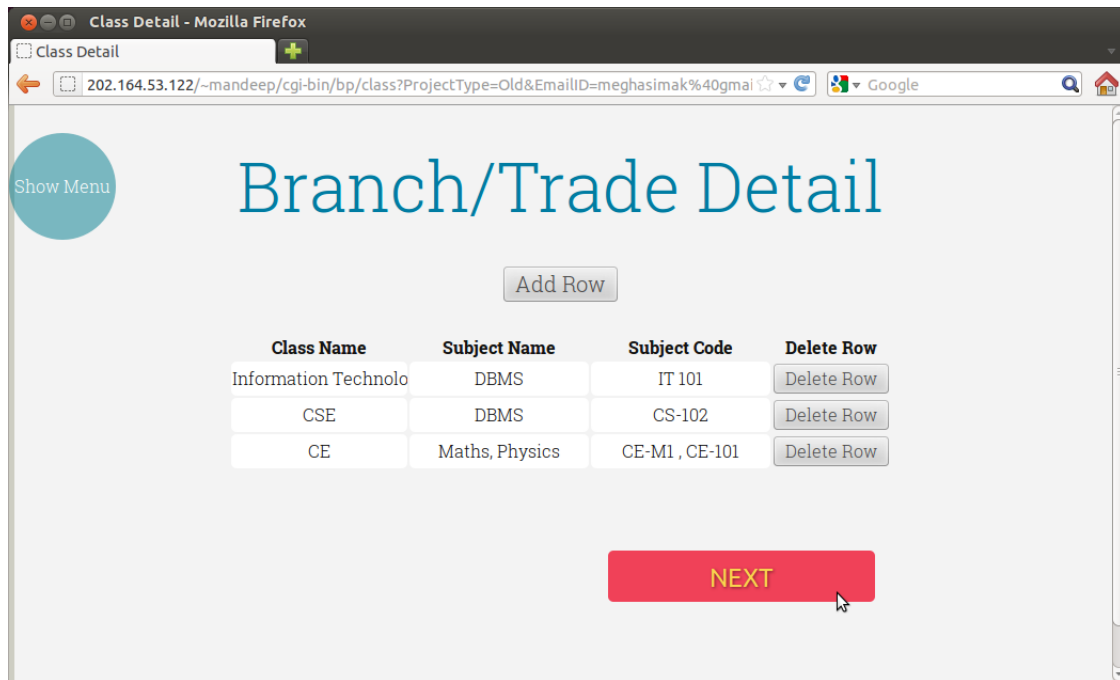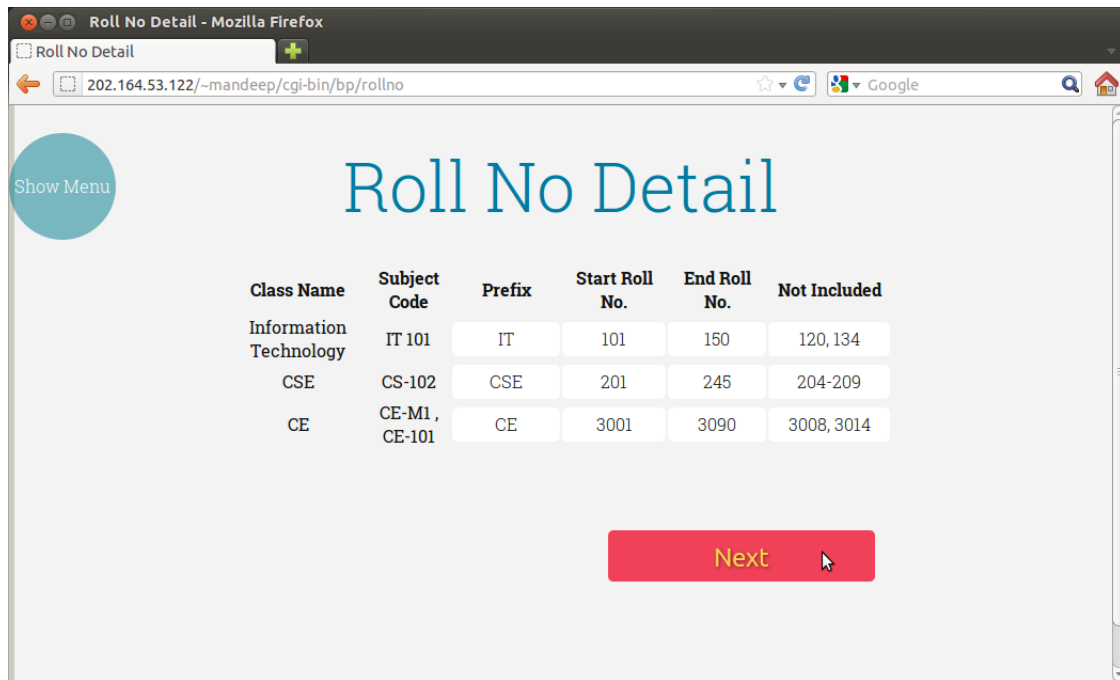
Figure 19: Class Detail

4.19.4   Roll No Detail

Figure 20: Roll No Detail

4.19.5   Datesheet Detail
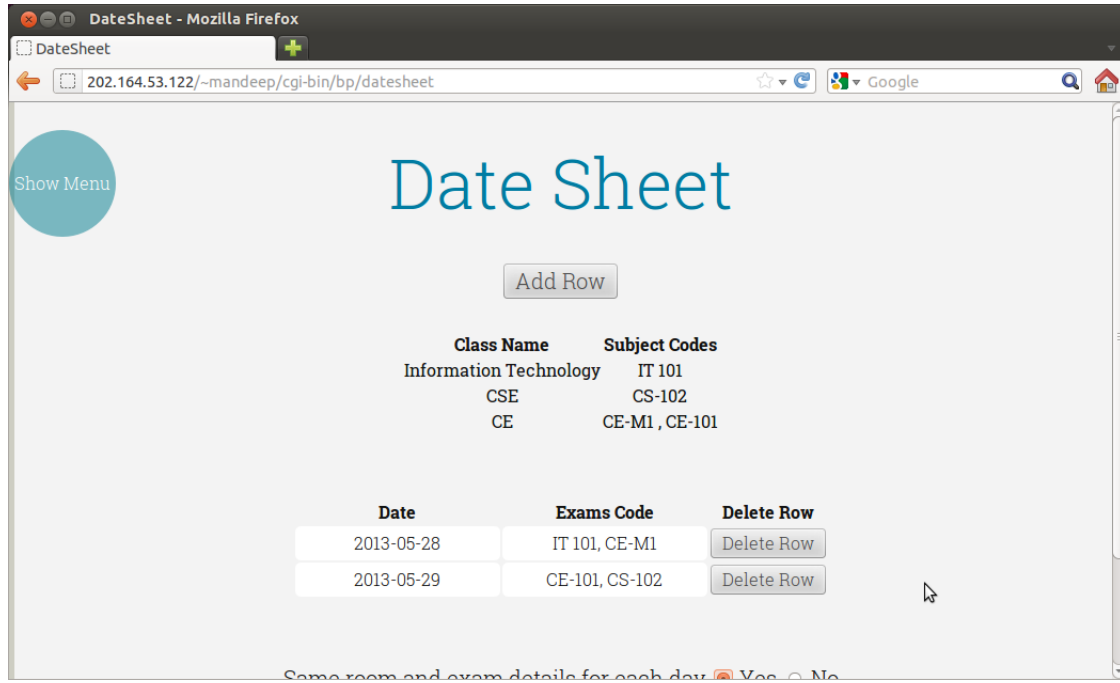
Figure 21: Datesheet Detail

4.19.6 Exam Detail

Figure 22: exam Detail

4.19.7 Room Detail
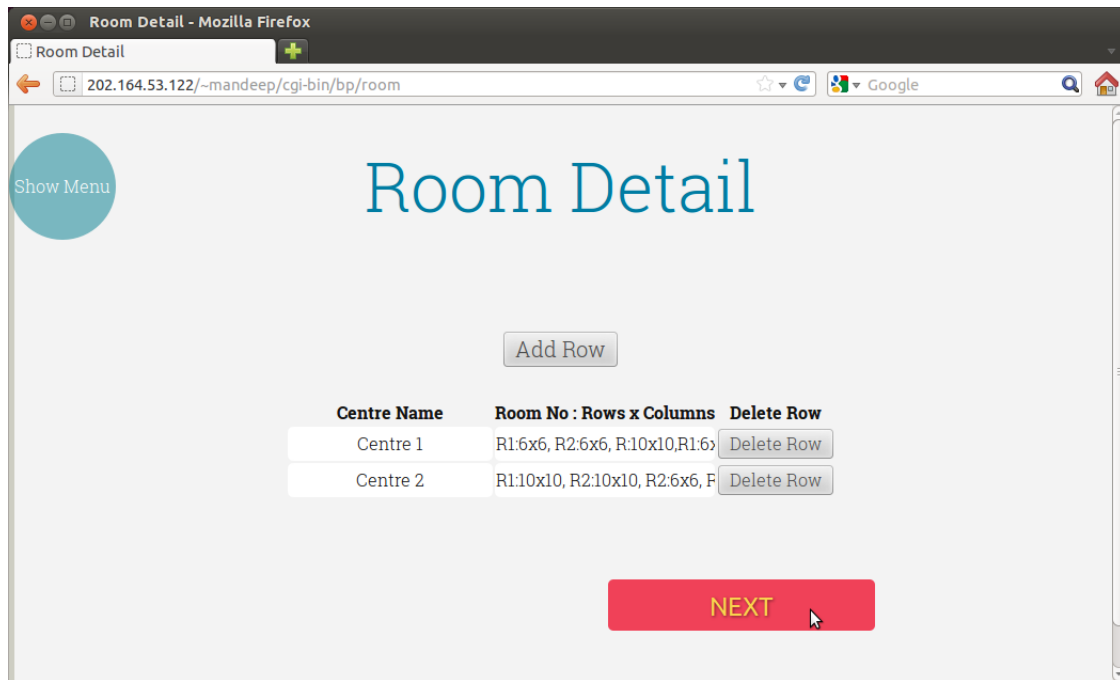
Figure 23: Room Detail

4.19.8 Select Strategy
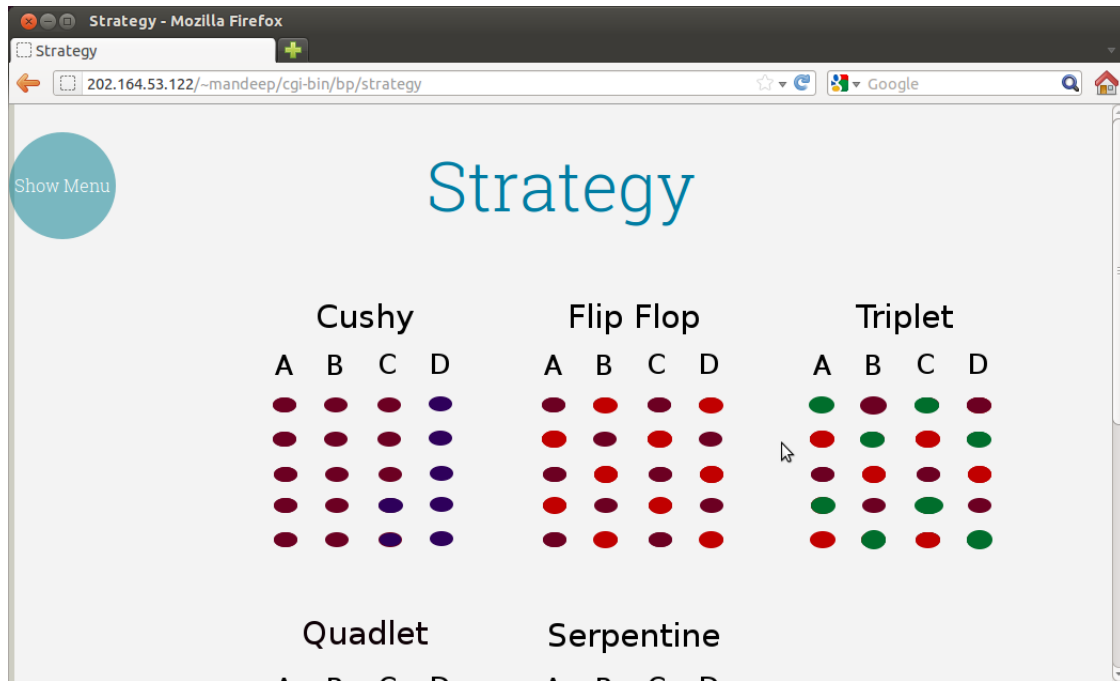
Figure 24: Select Strategy

4.19.9   Validate Strategy
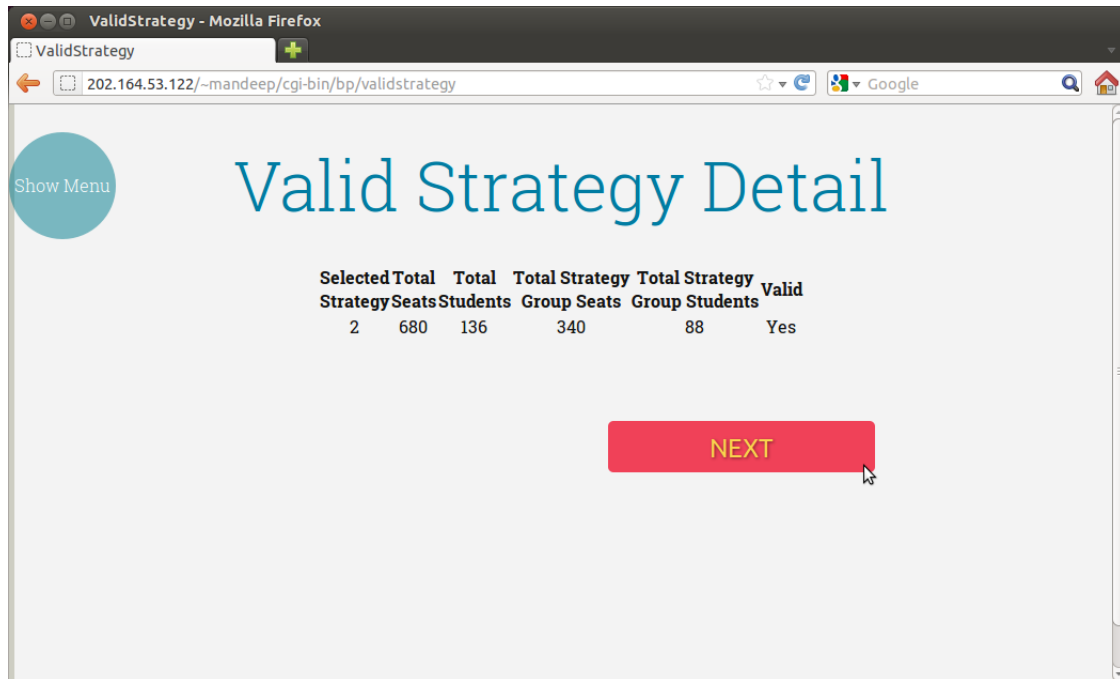
Figure 25: Validate Strategy

4.19.10   Seating Plan
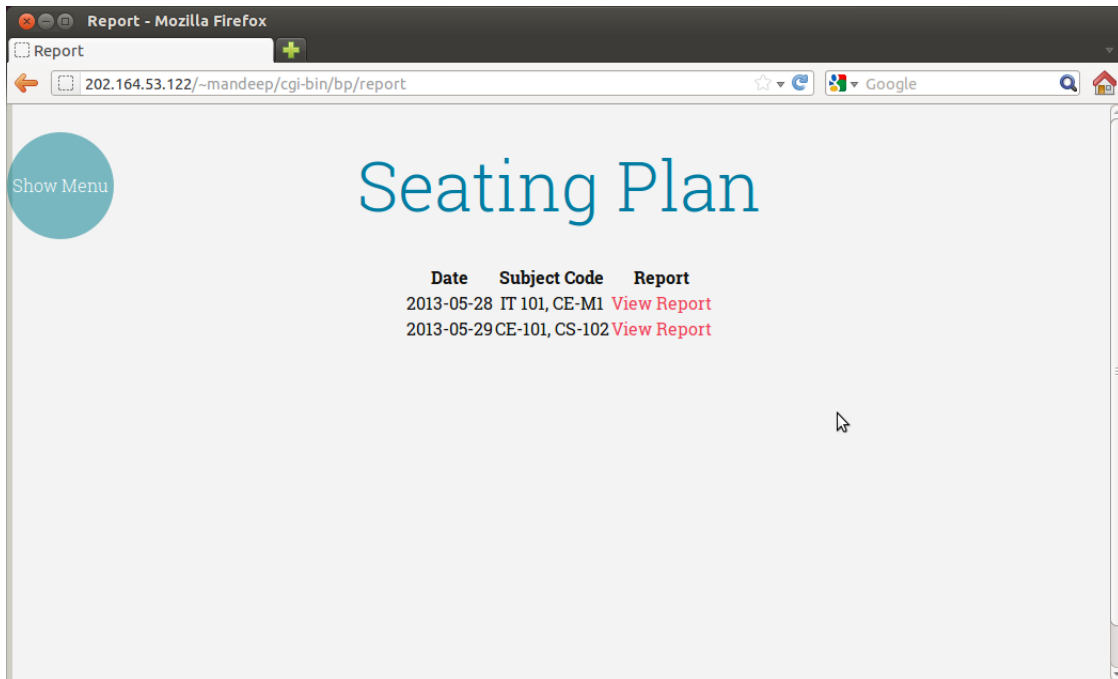
Figure 26: Download Report

4.19.11   Generated Seating Plan

Figure 27: Generated Seating Plan

5   Project legacy

5.1   Conclusion

BaKaPlan is an very efficient application which allocate seats for examination, auditorium or large rooms through program. It cam be used by schools, colleges, universities, etc. It provided five strategies(Cushy, Flip-Flop, Triplet, Quadlet and Serpentine). It is less time consuming and user friendly. It has been successfully used in our college for GATE Examination 2013.

5.2 Current status

BaKaPlan is web based application. It will generate seating plan in five different strategies. This application has following working modules:

- Web based user Interface for filling class/branch, room, roll no or datesheet detail.

- It has five different strategies for generating seating plan.

  - Cushy
  - Serpentine
  - Flip Flop
  - Triplet
  - Quadlet

- Multiple users can generate seating plan at a time.

- Accurate seating plan for examination, conferences, etc.

- Generated seating plan in HTML format.

- Maintains record or each seating plan generated by BaKaPlan.

5.3   Future Scope

BaKaPlan is the only one software which generate seating plan automatically. It has great scope in future. I will add more streategies in BaKaPlan. I will also add following modules:

- Feature to send SMS to students about their seat location before examination.

- Add another database like postgreSQL in BaKaPlan to increase its productivity.

- Also create deb package to ease installation steps.

6 Bibliography

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