CS 232 Project Report

GIKI Student Management System

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Abstract

This report specifies the various processes and techniques used in gathering requirements, designing, implementing and testing for the project on university management system. This project aims to solve some of those problems and thus, add more value to the current system. The requirements were gathered from all the stakeholders and based on that we created a requirements model and designed the software. The project was implemented in the form of a website using django(python).

Using the various resources and tools we gathered along the way, we implemented the college ERP system using some features that solve the current problems in the system such as a provision to edit the attendance and marks before locking it at the end. The software was also tested using the various testing methods and results were positive.

Thus, the results can be integrated in the current ERP system to improve it's working and solve some of the existing problems.

Contents

1. Introduction:

This project proposes the development of a centralized information system to address these challenges and improve overall organizational effectiveness. This system will integrate core functionalities, fostering collaboration and providing a unified platform for data management. The benefits of such a system include:

Improved efficiency: Streamlined workflows and automation will reduce administrative burden and free up valuable resources.

Enhanced accuracy: Data consistency and integrity will be ensured through a centralized system, minimizing errors and discrepancies.

Increased accessibility: Authorized users will have convenient access to relevant information, facilitating informed decision-making.

Boosted collaboration: The system will promote seamless collaboration between departments, fostering a more cohesive organizational environment.
This project report explores the design and implementation of this centralized information system, aiming to provide a comprehensive solution for managing critical organizational functions.

1.1   Identification

Educational institutions face challenges in managing student data, staff operations, and internal processes efficiently. Traditional manual methods can be time-consuming, prone to errors, and lack accessibility.

1.2   Purpose

The purpose is to design software for college database which contains up to date or accurate information of the college. That should improve efficiency and flexibility of college record management and to provide a common and or simple platform for everyone to access the student's information. College Automation System consists of different modules such as student, faculty, admin etc. Our main purpose is to create a software which will manage the working of these different modules. The interconnectivity among modules reduces the time to perform different operational task.

1.3   Scope

College management is becoming a very essential component in education in this modern day age. With the help of College Automation System we can gather all the useful information needed to the management in few clicks. The College ERP system now computerizes all the details that are maintained manually. Once the details are fed into the system or computer there is no need for various persons to deal with separate sections.

Only a person is enough to maintain all the reports and records. The security can also be given as per the user requirement.

1.4   Product Features

- Each teacher will be able to enter attendance and marks for their respective students.

- Each student will be able to view the attendance status for their respective courses.

- The teachers will be able to apply for various types of leave directly through the system.

- The students will be able to Communicate and provide feedback to their teachers.

- The students will have access to a forum page where they are communicating will each other.

- The administrator will be able to view and update information such as departments, classes, teachers, students, courses.

1 Overall Description

User Classes and Characteristics

There are several types of end users for the college ERP system. They are broadly divided into Students, Staff and the Administrator. Each of these classes has their own set of features.

The student should have the following features:

- View the Attendance status of the courses to which they are enrolled.

- View the Marks of the courses to which they are enrolled.

- View the notification from the college administrator.

- Communicate or give feedback to their respective teachers.

- Communicate with other students of the same university.

The staff should have the following features:

- Access to the information of all students that attend their courses.

- Add and edit the Attendance status of those students.

- Add and edit the exam marks of those students.

- Avail the different types of leave.

- Swap classes with other teachers who teach for the same class.

The administrator should have the following features:

- Add and update students, teachers, and courses.

- Assign teachers and students to courses.

Operating Environment

The operating environment for College ERP system are listed below:

- Operating System: Windows 10

- Database: MySQL database

- Front end: HTML/CSS/Bootstrap

- Back end: Django

2 Requirements

2.3 Expected requirement: Student and staff information

Description and priority Information regarding students, teachers and courses are stored in the database. Every user can view only certain information based on their user class. For example, a teacher can view student and course information that they are handling. This feature is of high priority as the information must be viewed by only the authorized users.

Functional requirements

- Each user shall be able to view information in the database based on their user class.

- The administrator shall be able to view all the information in the database.

2.4 Normal requirement: Attendance and marks entry

Description and priority Attendance and marks entry is the main feature of the Col- lege ERP system. Hence, the priority is high. Teachers update the attendance and marks of the students who are part of her class. Students can view their respective Attendance and marks of the courses they have taken.

Functional requirements

- Teachers shall be able to view, update and edit the attendance and marks of the students, part of their class.

- Teacher shall be able to take extra classes, switch classes with other teachers.

2.5 Exciting requirement: Communication among students and teachers

Description and priority Students and teacher will be able to communicate with each other directly using the ERP system. Students may give their queries and feedback to a teacher and they may respond accordingly. The priority of this feature is low as cost of implementation could be very high. A simple version of this feature is to be implemented.

Functional requirements

- Students shall be able to communicate with their teachers by sends personal messages.

- Students shall be able to communicate with other students through a forum section.

3 External Interface Requirements

3.3 User Interfaces

The User interface is made using Bootstrap. Firstly, there will be a simple login page separate for students and teachers. Each student and teacher will have a unique interface. There will be a fixed sidebar with links to all the modules. The teachers will be able to view their respective students and update their attendance and marks using an effortless interface.

3.4 Hardware Interfaces

Since neither the mobile application nor the web portal have any designated hardware, it does not have any direct hardware interfaces. Any browser can be used to access the webapp.

3.5 Software Interfaces

The following is a list of software used in making the project.

- Operating System: We have chosen the Windows operating system for its best support and user-friendliness.

- Django: We have chosen to use Django for the back end of the website as Django is a simple python framework and is suitable for beginners.

- Database: We are using SQLite database, which comes as default with Django.

3.6 Communications Interfaces

This project is to be deployed on an online website. All the users can connect to the database server from anywhere and have access to their information.

4   Non-functional requirements

4.3   Safety requirements

If there is extensive damage to a wide portion of the database due to catastrophic failure, such as a disk crash, the recovery method restores a past copy of the database that was backed up to archival storage (typically tape) and reconstructs a more current state by reapplying or redoing the operations of committed transactions from the backed-up log, up to the time of failure.

4.4   Security requirements

The database contains sensitive information of all the students and staff. Therefore, optimal security measures must be taken to ensure data is safe from unauthorized users.

4.5   Software Quality Attributes

Availability: The users must always be able to view their information so that they can keep track regularly.

Correctness: The information about attendance and marks must be correct to not feed wrong information to the users.

portability: The users access the ERP from various platforms such as desktops and mobile phones. The Webapp must be portable to all platforms and the user experience must be optimal.

5 System Design

Various Design concepts and processes were applied to this project. Following concepts like separation of concerns, the software is divided into individual modules that are functionally independent and incorporates information hiding. The software is divided into 3 modules which are students, teachers and administrators. We shall look at each module in detail.

5.3 Student

Each student belongs to a class identified by semester and section. Each class belongs to a department and are assigned a set of courses. Therefore, these courses are common to all students of that class. The students are given a unique username and password to login. Each of them will have a different view. These views are described below.

- **Student information**
  Each student can view only their own personal information. This includes their personal details like name, phone no, address etc. Also, they can view the courses they are enrolled in and the attendance marks of each of those.

- **Attendance information**
  Attendance for each course will be displayed. This includes the number of attended classes and the attendance percentage. If the attendance percentage if below a specified threshold, say 75%, It will be marked in red otherwise it be in green. There will also be a day-wise attendance view for each course which shows the date and status. This will be presented in a calendar format.

- **Marks information**
  There will be 5 events and 1 semester end examination for each course. The marks for each of these will be provided in the ERP system.

- **Notifications and events**
  This section is common to all students. Notifications are messages from the admin such as declaration of holidays, test time-table etc. The events and their details are specified here.

5.4 Teacher

Each teacher belongs to a department and are assigned to classes with a course. Teachers will also have a username and password to login. The different views for teachers are described below.

- **Information**
  The teachers will have access to information regarding the courses and classes they are assigned to. Details of the courses include the credits, the syllabus plan. Details of the class include the department, semester, section and the list of students in

each class. The teacher will also have access to information of students who belong to the same class as as the teacher.

- **Attendance**
  The teacher has the ability to add and also edit the attendance of each student. For entering the attendance, they will be given the list of students in each class and they can enter the attendance of the whole class on a day to day basis. There will be two radio buttons next to each student name, one for present and the other for absent. There will also be an option for extra classes. Teachers can edit the attendance of each student either for each student individually or for the whole class.

- **Marks**
  The teacher can enter the marks for the 5 events and 1 SEE for each course they are assigned. They also have the ability to edit the marks in case of any changes. Reports such as the report card including all the marks and CGPA of a student can be generated.

5.5   Administrator

The administrator will have access to all the information in the different tables in the database. They will access to all the tables in a list form. They will be able to add a entry in any table and also edit them. The design of the view for the admin will provide a modular interface so that querying the tables will be optimized. They will be provided with search and filter features so that they can access data efficiently.

5.6 Use Case Diagram

A use case diagram at its simplest is a representation of a user's interaction with the   system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well. The use cases are represented by either circles or ellipses.
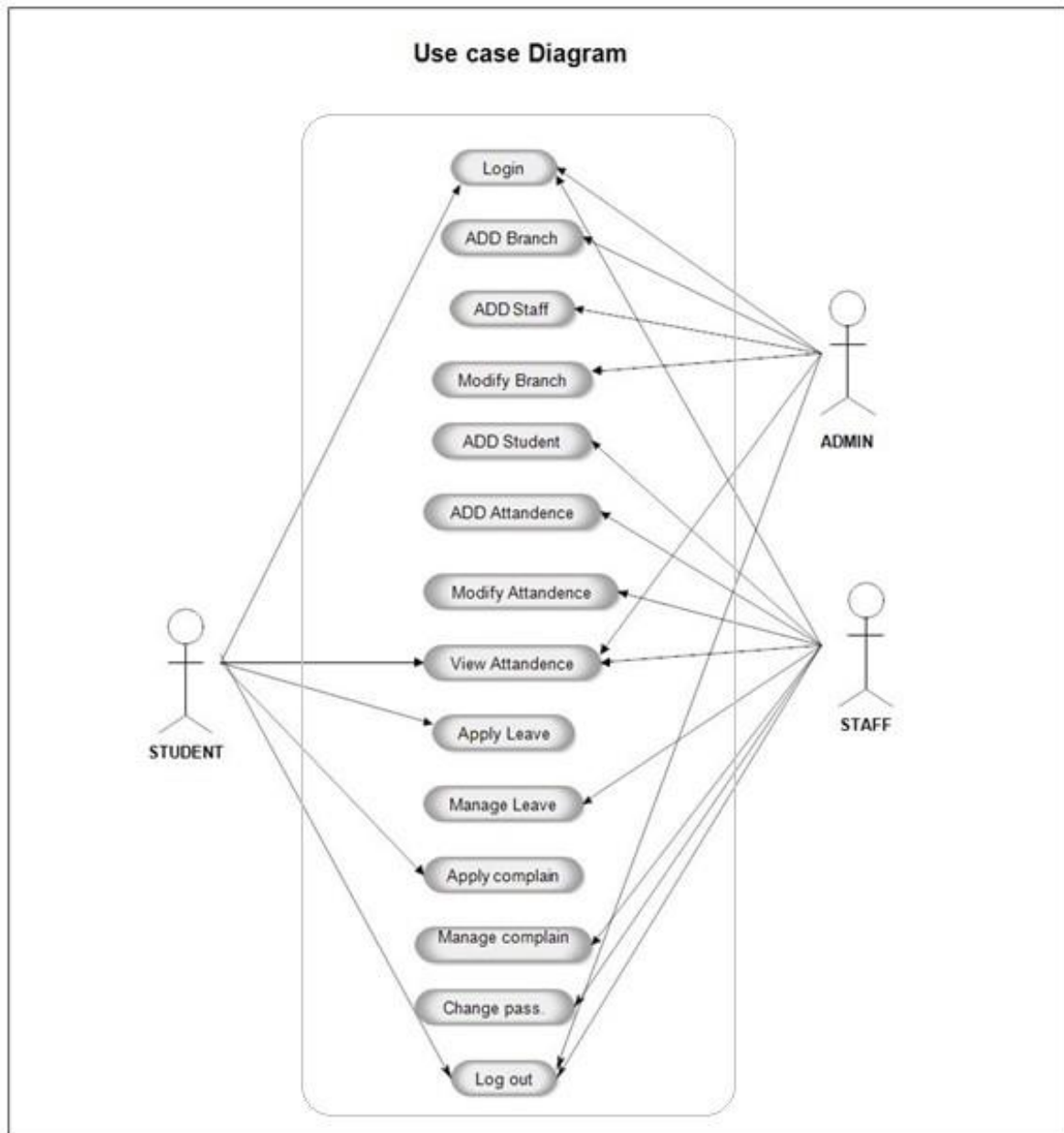

Figure 1: Use Case Diagram of college ERP

5.7   Relational Schema

The relational schema states the different tables involved in the databse. For each class, a set of attributes and method are included. The relationship between the classes are also specified. For example, the teacher class has the attributes Id, name, phone no, address and methods such as marking attendance, declaring marks and preparing report cards. Each instance of the teacher class belongs to a department. This is specified by the relationship between Teacher and Department classes.
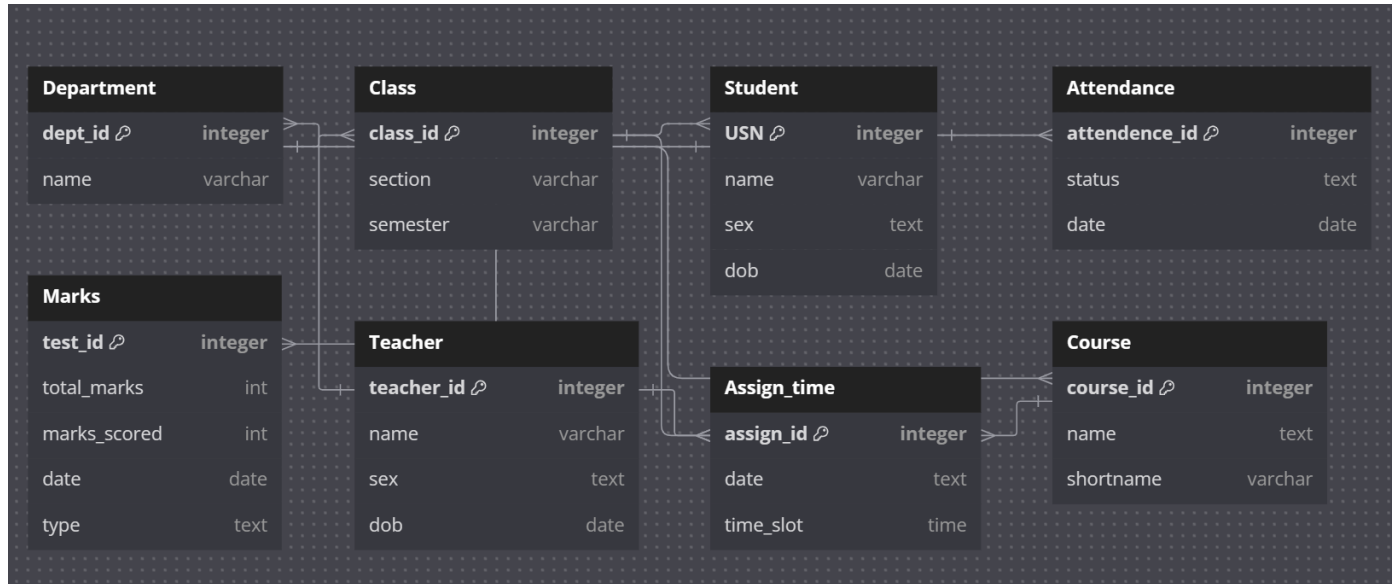
Figure 2: Class diagram of college ERP

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5.8   Entity Relationship Diagram

An entity relationship diagram (ERD) shows the relationships of entity sets stored in a database. An entity in this context is an object, a component of data. An entity set is a collection of similar entities. These entities can have attributes that define its properties.

By defining the entities, their attributes, and showing the relationships between them, an
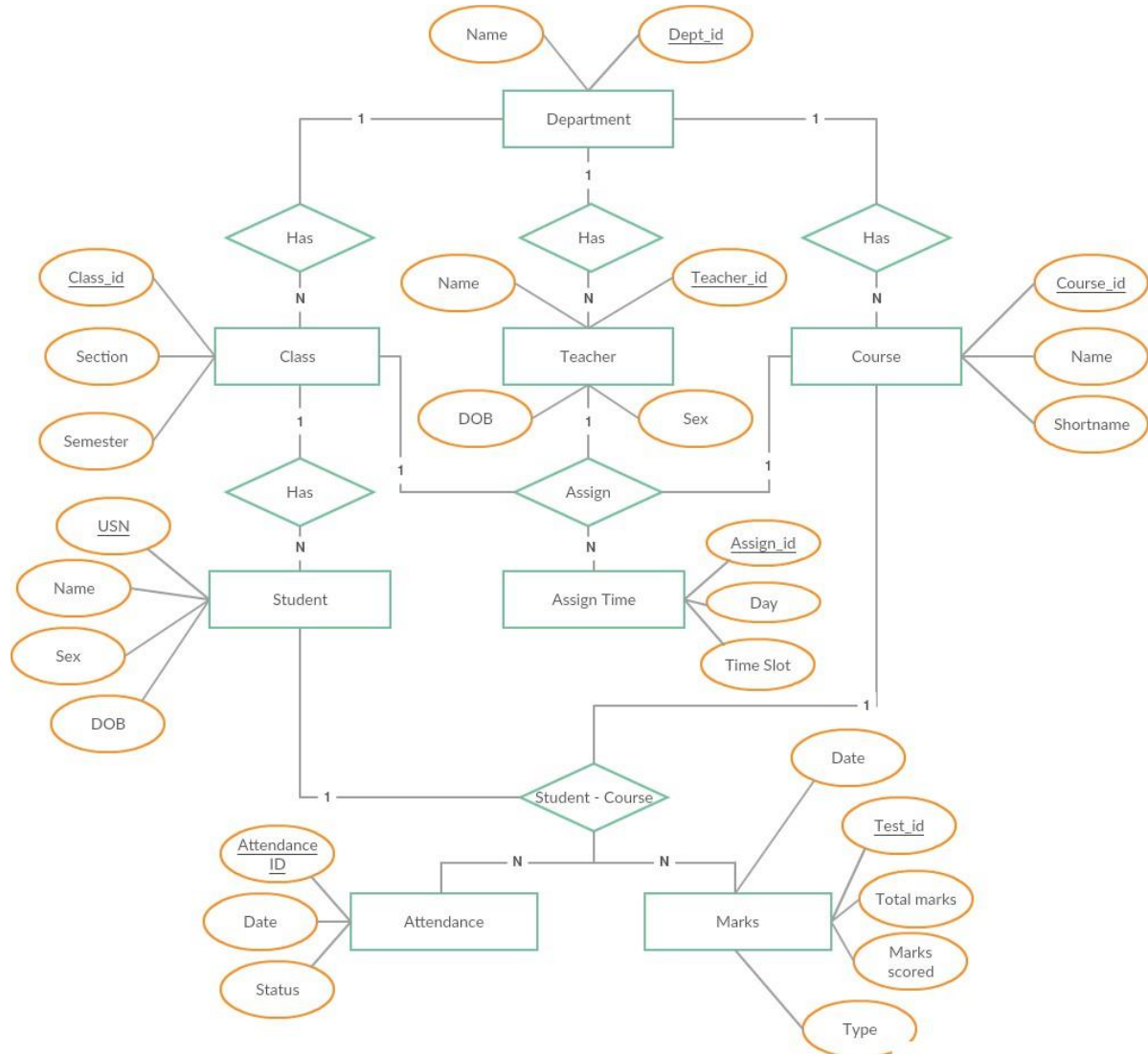
ER diagram illustrates the logical structure of databases. ER diagrams are used to sketch out the design of a database.

Figure 3: Entity Relationship diagram of college ERP

6 Implementation details

6.3 Architectural model

The ERP software requires the architectural design to represent the design of the software. Here we define a collection of hardware and software components and their interfaces to establish the framework for the development of this software.

There exists number of components of the system which are integrated to form a system. The set of connectors will help in coordination, communication, and cooperation between the components. The ERP software is built for computer-based system. It exhibits the data centric style of architecture.

The architecture comprises of various modules as given in the figure. There are 3 major categories in which the whole architecture is divided. These are administrator, staff and student. The architecture is designed such a way that it is self explanatory. The admin roles are user management, staff management, student management, staff attendance. Staff and admin perform some common functions like news management, leave management, time table management, exam management.

The role of staff includes student attendance entering, student examination management, time table management, leave application management, and put on news on e-notice board. While the roles of students are few in number and includes their complete
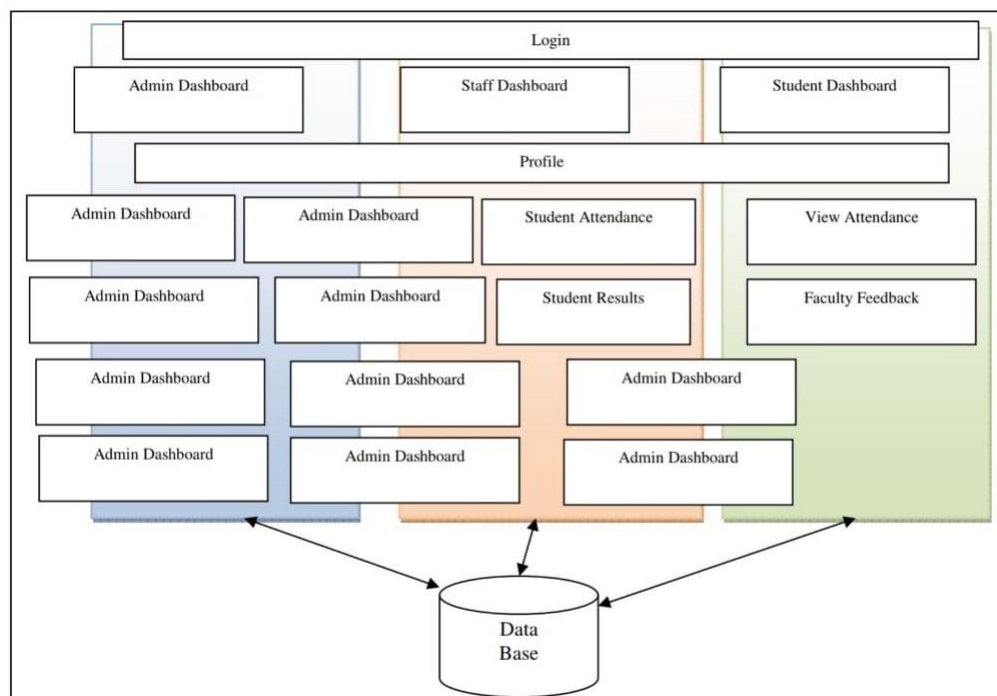
Figure 4: architecture

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profile viewing, view their attendance, give feedback to their respective faculties, view notice and view academic time table.

Generalizing E-college architecture is 3 tiers. The 3 tiers comprises of presentation layer, application logic layer and data layer.

Any Information System needs to communicate with external entities, human users or other computers. Presentation layer allows these entities to interact with the system; it can also be implemented as a GUI interface and can be referred to as the client of the IS.

Application layer do more than information delivery, they perform data processing (Busi- ness Logic and calculation) behind the results being delivered. This tier is often referred as
1. Services
2. Business rules
3. Business logic
4. Servers

The database layer is implemented using a Database Management System which in our case is MySql.
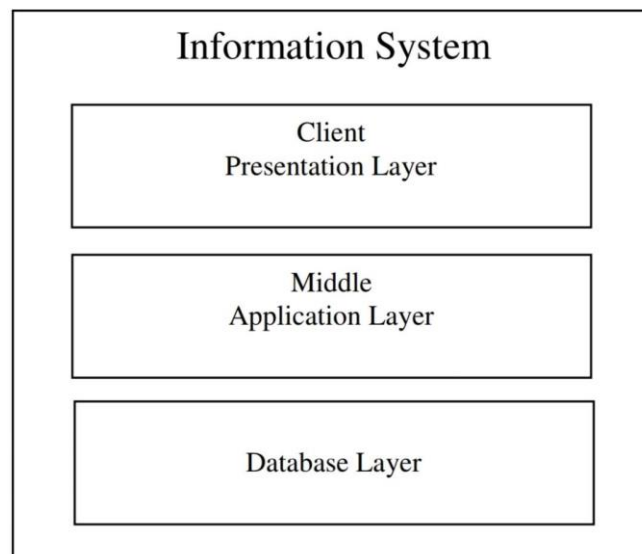
Figure 5: 3 tier architecture

7 Modules in the system

The college ERP system has three main user classes. These include the students, teachers and administrator. This section will explain in detail all the features and the working of those for each user class.

7.3 Student

7.4 Login

Each student in the college is assigned a unique username and password by the administrator. The username is the same as their USN and so is the password. They may change it later according to their wish.

7.4.1 Homepage

After logging in, students see sections for attendance, marks, and timetable. In attendance, they check total classes, attended classes, and percentages for each course. In marks, they view scores for internal assessments, events, and semester-end exams. Timetable shows their classes, days, and times.

7.4.2 Attendance

On the attendance page, there is a list of courses that depends on each student. For each course, the course id and name are displayed along with the attended classes, total classes, and the attendance percentage for that particular course. If the attendance per- centage is below 75 for any course, it is displayed in red denoting a shortage of attendance, otherwise it is green. If there is any shortage, it specifies the number of classes to attend to make up for it. If you click on each course, it takes you to the attendance detail page.

7.4.3 Attendance Detail

This page displays more details for attendance in each course. For each the course, there is a list of classes conducted and each is marked with the date, day and whether the student was present or absent on that date.

7.4.4 Marks

The Marks page is a table with an entry for each of their courses. The course id and name are specified along the marks obtained in each of the tests and exams. The tests

include 3 internal assessments with marks obtained out of a total of 20, 2 events such as project, assignment, quiz etc., with marks out of 20. Lastly, one semester end exam with marks out of 100.

7.4.5 Timetable

This page is a table which lists the day and timings of each of the classes assigned to the student. The row headers are the days of the week and the column headers are the time slots. So, for each day, it specifies the classes in the time slots. The timetable is generated automatically from the assign table, which is a table containing the information of all the teachers assigned to a class with a course and the timings the classes.

7.5 Teacher

7.5.1 Login

Each teacher in the college is assigned a unique username and password by the administrator. The username is their teacher ID and the same for password. The teacher may change the password later.

7.5.2 Homepage

After successful login, the student is presented with a homepage with their main sections, attendance, marks, timetable and reports. In the attendance section, the teacher can enter the attendance of their respective students for the days on which classes were conducted. There is a provision to enter extra classes and view/edit the attendance of each individual student. In the marks section, the teacher may enter the marks for 3 internals, 2 events and 1 SEE for each student. They can also edit each of the entered marks. The timetable provides the classes assigned to the teacher with the day and timings in a tabular form. Lastly, the teacher can generate reports for each of their assigned class.

7.5.3 Attendance

There is a list of all the classes assigned to teacher. So, for each class there are 3 actions available. They are,

7.5.4 Enter Attendance

On this page, the classes scheduled or conducted is listed in the form of a list. Initially, all the scheduled classes will be listed from the start of the semester to the current date. Thus, if there is class scheduled for today, it will automatically appear on top of the list. If the attendance of any day is not marked it will be red, otherwise green if marked. Classes can also be cancelled which will make that date as yellow. While entering the attendance, the list of students in that class is listed and there are two options next to each. These options are in the form of a radio button for present and absent. All

the buttons are initially marked as present and the teacher just needs to change for the absent students.

7.5.5 Edit Attendance

After entering attendance, the teacher can also edit it. It is similar to a screen for entering attendance, only the entered attendance is saved and display. The teacher can change the appropriate attendance and save it.

7.5.6 Extra Class

If a teacher has taken a class other than at the scheduled timings, they may enter the attendance for that as well. While entering the extra class, the teacher just needs to specify the date it was conducted and enter the attendance of each of the students. After submitting extra class, it will appear in the list of conducted classes and thus, it can be edited.

7.5.7 Student Attendance

For each assigned class, the teacher can view the attendance status of the list of students. The number of attended classes, total number of classes conducted, and the attendance percentage is displayed. If the attendance percentage of any of the students is below 75, it will be displayed in red. Thus, the teacher may easily find the list of students not eligible to take a test.

7.5.8 Student Attendance Details

The teacher can view the attendance detail of all their assigned students individually. That is, for all the conducted classes, it will display whether that student was present or absent. The teacher can also edit the attendance of each student individually by changing the attendance status for each conducted class.

7.5.9 Marks

On this page, the list of classes assigned to the teacher are displayed along with two actions for each class. These actions are,

7.5.10 Enter Marks

On this page, the teacher can enter the marks for 3 internal assessments, 2 events and one semester end exam. Initially all of them are marked red to denote that the marks have not been entered yet. Once the marks for a test is entered, it turns green. While entering the marks for a particular test, the list of students in that class is listed and marks can be entered for all of them and submitted. Once, the marks are submitted, the students can view their respective marks. Incase if there is a need to change the marks of any student, it is possible to edit the marks.

7.5.11 Edit Marks

Marks for a test can be edited. While editing, the list of students in that class is displayed along with already entered marks. The marks to be updated can be changed and submitted. The students can view this change immediately.

7.5.12 Student Marks

For each assigned class, the teacher has access to the list of students and the marks they obtained in all the tests. This is displayed in tabular form.

7.5.13 Timetable

This page is a table which lists the day and timings of each of the classes assigned to the teacher. The row headers are the days of the week, and the column headers are the time slots. So, for each day, it specifies the classes in the time slots. The timetable is generated automatically from the assigned table, which is a table containing the information of all the teachers assigned to a class with a course and the timings the classes.

7.5.14 Free teachers

For each entry in the table, the list of free teachers can be generated. Free teachers are the teachers who are assigned to the class and are free for that time slot on that day. This is very useful for the teachers, particularly when they are on leave as it helps them find a suitable replacement are that class.

7.5.15 Reports

The last page for the teachers is used to generate reports for each class. The report specifies the list of students in that class and their respective CIE and attendance percentage. CIE is the average of the marks obtained from the tests, 3 internals and 2 events. The CIE is out of 50 and the students with CIE below 25 are marked in red and are not eligible to write the semester end exam. Also, the attendance percentage is displayed with students below 75% marked in red.

7.6   Administrator

The Administrator oversees crucial tasks such as managing departments, students, teachers, classes, and courses within the system. This involves creating and maintaining records for each entity in their respective database tables. Additionally, the Administrator handles the assignment of teachers to classes along with their associated courses and schedules, with this data being stored in the Assign table.

Furthermore, the Administrator has the authority to access and modify student marks and attendance records. To streamline database queries, various features have been implemented to ensure efficiency. Given the potential size of the database, a search functionality is available for every table, facilitating the quick retrieval of specific records based on name or ID. Moreover, filtering options enable the Administrator to refine search results based on criteria such as department or class.

8 Screenshots of the implemented system
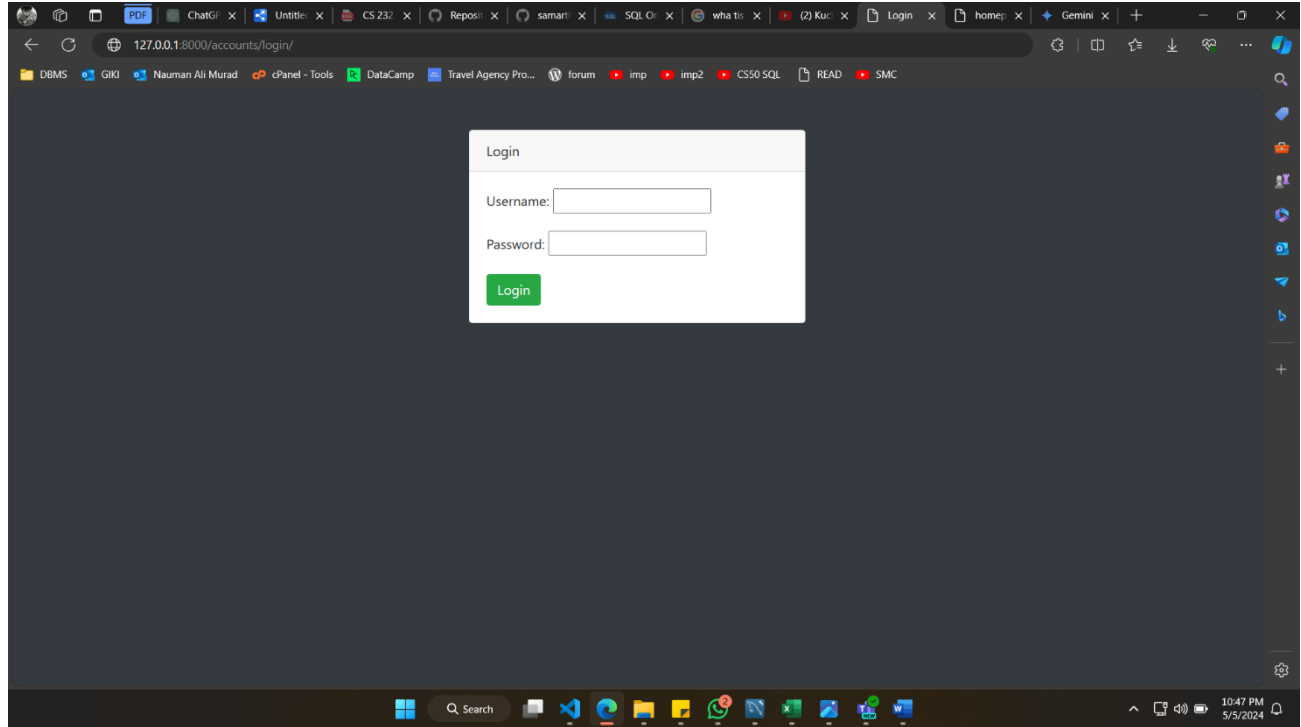
Figure 8: Student Login Page
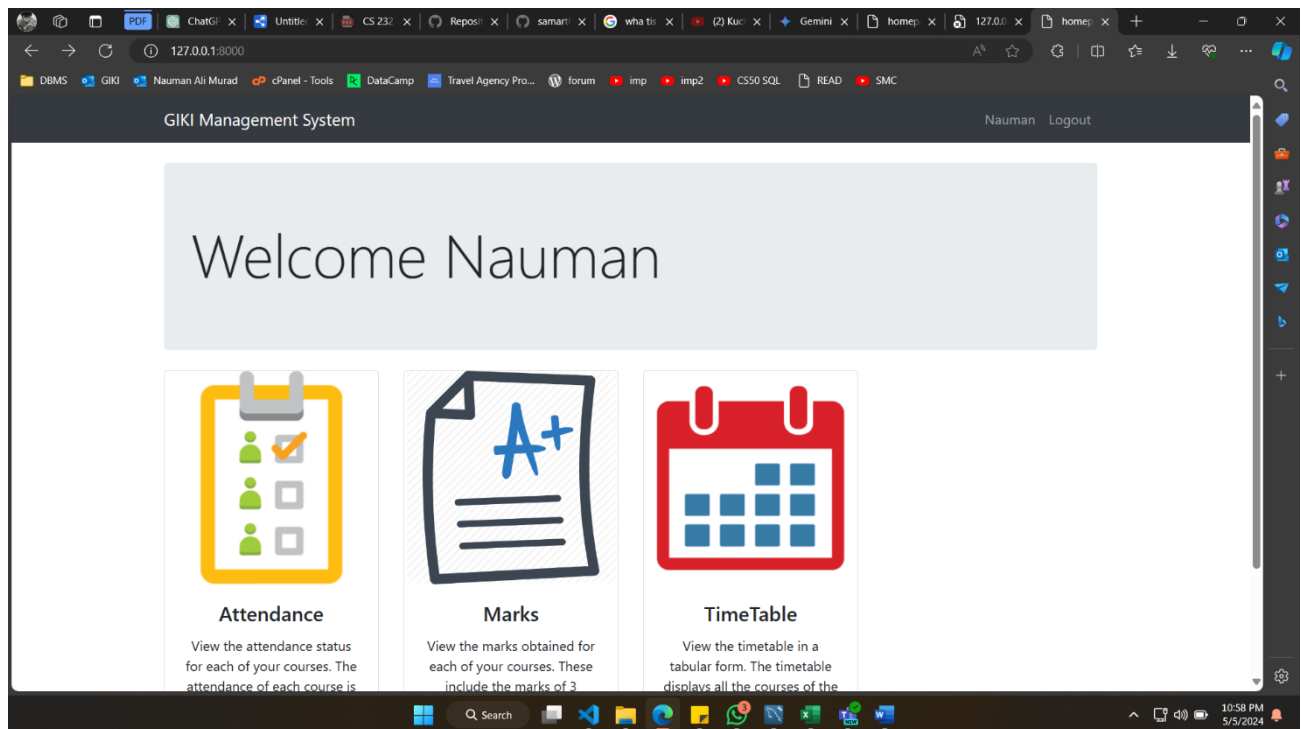
Figure 9: Student Home Page

Figure 10: Student Attendance Page

Figure 11: Student Attendance Detail Page

Figure 12: Student Marks Page

Figure 13: Student Timetable

Figure 14: Teacher Login

Figure 15: Teacher homepage

Figure 16: Entering attendance

Figure 17: Editing attendance

USN	Student name	Attended classes	Total classes	Attendance %	Classes to attend
CS01	Dakshath	8	10	80.0	0
CS02	Farhan	10	10	100.0	0
CS03	Nihal	7	10	70.0	2
CS04	Nikhil	8	10	80.0	0
CS05	Rajat	10	10	100.0	0
CS06	Renu	10	10	100.0	0
CS07	Anudeep	8	10	80.0	0
CS08	Samarth	8	10	80.0	0
CS09	Shahid	10	10	100.0	0
CS10	Shravan	7	10	70.0	2
CS11	Boss	10	10	100.0	0
CS12	Tejus	9	10	90.0	0
CS13	Vijeth	8	10	80.0	0

Figure 18: Attendance of students in a class

Figure 19: Attendance details of an individual student

#	Date	Day	Status	
1	Oct. 26, 2018	Friday	Absent	Change
2	Oct. 29, 2018	Monday	Present	Change
3	Oct. 31, 2018	Wednesday	Present	Change
4	Nov. 1, 2018	Thursday	Present	Change
5	Nov. 2, 2018	Friday	Present	Change
6	Nov. 7, 2018	Wednesday	Present	Change
7	Nov. 8, 2018	Thursday	Absent	Change
8	Nov. 9, 2018	Friday	Present	Change
9	Nov. 12, 2018	Monday	Present	Change
10	Nov. 15, 2018	Thursday	Present	Change

Figure 20: Entering marks.

Figure 21: Editing marks

Student USN	Student Name	Internals 1	Internals 2	Internals 3	Event 1	Event 2	SEE
CS01	Dakshath	20	10	10	14	16	0
CS02	Farhan	15	15	10	13	16	0
CS03	Nihal	12	19	20	12	16	0
CS04	Nikhil	19	19	10	11	16	0
CS05	Rajat	14	20	20	10	15	0
CS06	Renu	12	15	10	9	15	0
CS07	Anudeep	15	15	20	8	15	0
CS08	Samarth	9	15	10	15	15	0
CS09	Shahid	8	15	20	16	15	0
CS10	Shravan	7	1	10	17	12	0
CS11	Boss	15	13	20	18	15	0
CS12	Tejus	14	12	10	19	15	0
CS13	Vijeth	12	15	20	20	15	0

Figure 22: Marks of all the students in a class

Figure 23: Teacher Timetable

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Figure 25: Attendance for a class of students

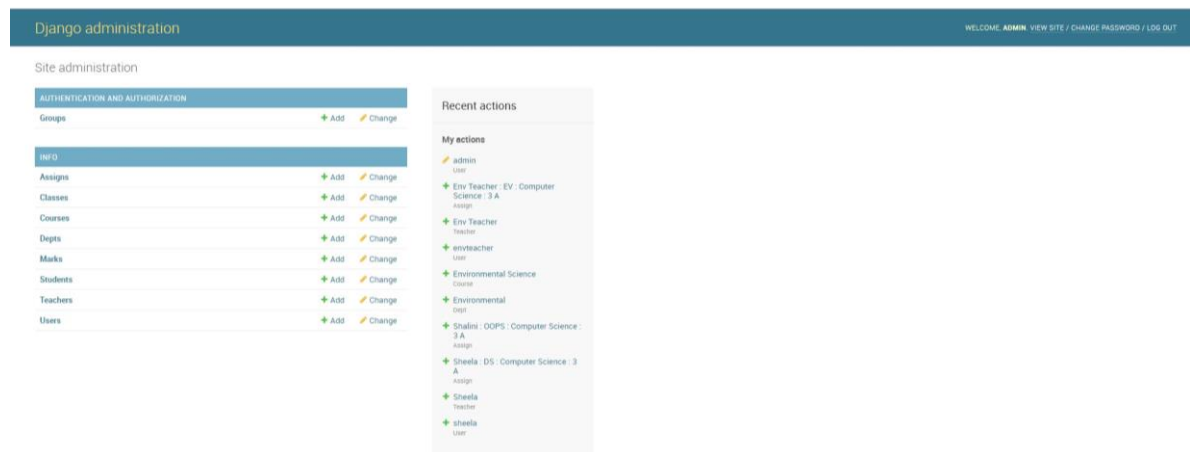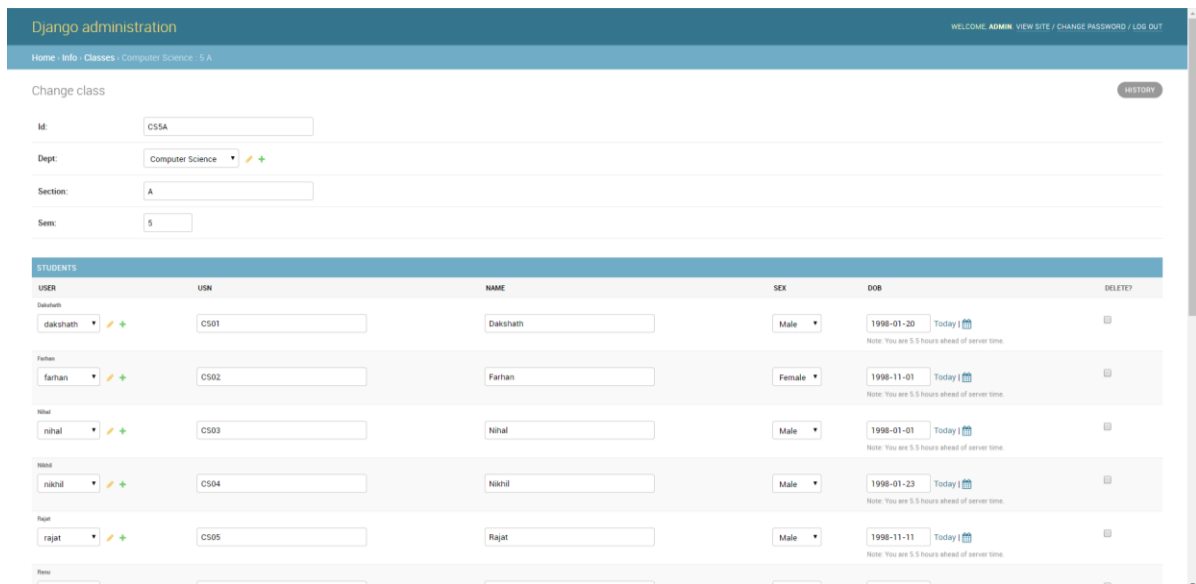| Student USN	Student Name	Attendance	CIE
CS01	Dakshath	80.0	35
CS02	Farhan	100.0	35
CS03	Nihal	70.0	40
CS04	Nikhil	80.0	38
CS05	Rajat	100.0	40
CS06	Renu	100.0	31
CS07	Anudeep	80.0	37
CS08	Samarth	80.0	32
CS09	Shahid	100.0	37
CS10	Shravan	70.0	24
CS11	Boss	100.0	41
CS12	Tejus	90.0	35
CS13	Vijeth	80.0	41

Figure 26: Admin homepage

Figure 27: Admin students table page

9   Conclusion and future work

The limitations of the existing file-based system highlight the need for a more efficient solution. Traditional methods are time-consuming, lack automation, and make data retrieval cumbersome. This project introduces a College Student Management System, designed to address these challenges. It streamlines various college operations, transforming them from manual processes to a user-friendly, web-based application.

Benefits:

- **Reduced workload and time savings:** The system automates tasks, eliminates manual calculations, and provides on-demand reports, freeing up valuable staff time.

- **Enhanced accessibility:** Students, faculty, and administrators can easily access relevant information based on their roles and permissions.

- **Improved information accuracy:** Real-time data ensures consistency and eliminates errors associated with manual record-keeping.

- **Efficient data storage and retrieval:** The system provides a centralized repository for all student and college information, facilitating easy retrieval and analysis.

- **Paperless operations:** The system promotes a paperless environment, reducing waste and simplifying record management.

- **Remote access:** Authorized users can access and manage data remotely.

- **Informed decision-making:** Data-driven insights empower college management to make informed decisions.

By implementing this Student Management System, colleges can significantly improve operational efficiency, enhance user experience, and empower data-driven decision-making for a more effective and streamlined educational environment.

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