DBMS PROJECT ON COLLEGE MANAGEMENT SYSTEM

Mini Project report submitted to
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By

KESHAV AGARWAL   **BT21CSE001**
NIRMIKA GAIKWAD   **BT21CSE060**
BINIT GALA   **BT21CSE072**

Under the guidance of

Dr Vishesh P. Gaikwad

Indian Institute of Information Technology,
Nagpur **441108 (India)**

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1. Introduction

In an era driven by digital innovation and evolving educational paradigms, the Online College Management System stands as a transformative project poised to revolutionize academic administration. This project aims to craft an integrated digital platform that redefines the management of college operations, transcending geographical barriers and ushering in a new era of efficiency, accessibility, and streamlined processes.

The landscape of higher education today demands dynamic solutions to navigate the complexities inherent in academic institutions. With diverse departments, a myriad of courses, intricate interactions between faculty and students, and the ever-expanding array of administrative tasks, there arises an urgent need for a comprehensive online management system.

This project introduction sets the stage for the development of an Online College Management System, emphasizing its significance in reshaping how colleges manage their administrative, academic, and communication processes. This system envisions a centralized hub that empowers colleges to efficiently orchestrate operations, enhance collaboration, and elevate the academic experience for all stakeholders.

The College Management System is a crucial tool for educational institutions, providing comprehensive monitoring and accessibility features. It enables staff members to log in and access pertinent college information, including student records and marks. Developed to streamline operations, this system ensures easy information retrieval and management within the college community. Users must register to gain access and modify data based on assigned permissions. Essentially, it functions as an information management system, allowing authorized staff and students to access specific database information tailored to their roles within the institution

2. Literature Review

2.1 Database Management in Educational Systems:

The foundational aspects of database management within educational systems have garnered significant attention in research literature. Scholars highlight the pivotal role of well-structured database schemas in ensuring data integrity and efficient information retrieval. Notably, normalization techniques have been emphasized to eradicate redundancy, thereby organizing academic data systematically. The establishment of meaningful relationships between database entities through foreign key constraints remains a critical aspect, underscoring the necessity of a robust structural foundation in educational management systems.

2.2 Usability and User Interface Design:

The user interface (UI) and its impact on user experience form a significant dimension in educational management system literature. Research investigates design principles contributing to user-friendly interfaces, facilitating seamless interactions for administrators, instructors, and students. The exploration extends to intuitive navigation, clear information presentation, and accessibility features. Recognizing the close tie between user satisfaction and UI efficiency, this review segment emphasizes the critical role of thoughtful interface design in college management system development.

2.3 User Authentication and Security Measures:

The literature emphasizes the paramount importance of user authentication and security measures within college management systems. Robust authentication mechanisms are deemed essential to safeguard sensitive data and prevent unauthorized access. Studies delve into best practices concerning password storage and encryption, fortifying the system against potential security threats. As educational institutions increasingly adopt digital platforms, ensuring the confidentiality and integrity of academic information emerges as a primary focus, making security measures a critical facet of system design.

2.4 Transaction Management and Data Consistency:

Transaction management's role in ensuring data consistency emerges as a pivotal subject in the literature. The complexities of academic environments necessitate meticulous consideration of

transactional operations to uphold database integrity. Existing research explores concepts like transaction isolation levels, commit and rollback mechanisms, and strategies for handling concurrent transactions. Synthesizing these concepts contributes to establishing a robust foundation for the college management system, guarding against data inconsistencies from concurrent database operations.

2.5 Scalability and Future-Proofing:

The scalability of educational management systems in the face of evolving academic landscapes stands as a recurring theme in scholarly discussions. As educational institutions expand in enrollment and course offerings, system scalability becomes imperative. Researchers delve into architectural considerations, data partitioning strategies, and technological choices that contribute to a system's seamless scalability. The exploration of future-proofing measures ensures adaptability to evolving academic needs without compromising performance or functionality.

2.6 Previous Approaches and Case Studies:

Case studies analyzing previous approaches to college management systems provide valuable insights into practical implementations. Examining the experiences of educational institutions adopting similar solutions offers nuanced understanding, showcasing challenges faced, successful strategies employed, and lessons learned. By scrutinizing real-world scenarios, this literature review segment enriches the overall comprehension of effective college management system development, bridging theoretical knowledge with practical wisdom.

3. Work done

Problem statement:

A college contains many departments. Each department can offer any number of courses. Many instructors can work in a department, but an instructor can work only in one department. For each department, there is a head, and an instructor can be head of only one department. Each instructor can take any number of courses, and a course can be taken by only one instructor. A student can enroll for any number of courses and each course can have any number of students.

In the above-stated raw problem, you need to play the role of a user as well as the developer and develop the mini-project from scratch. The project should meet all design goals from the general user perspective from start to end. Therefore you should need to strictly adhere following conditions while developing the project:

1. Identify all of the entities which will be useful in order to complete the goal of the project with respect to the perspective of the general user.
2. Design an ER-Diagram to draw a relationship between each of the entities.
3. Convert the ER-Diagram to 3NF tables.
4. Design a working module which includes the front-end and back-end to achieve the goal of the project. Some of the goals are as follows:

   a. Create a Web interface for data manipulation (insert, update and delete)

   b. Create a web interface to access the records based on the role of users (such as account info can be accessed by account personal as well as by admin)

   c. Develop a web interface to specify the schedule of exams and also show the performance of particular student marks.

   d. Develop a web interface for faculty for marks evaluation as well as marks update.

   e. Apart from this, please use your own intuition to add further modules.

5. Also add indexing concept to enhance the model performance.

3.1 Requirement Analysis:

Detailed examination of the needs and challenges faced by the college, including understanding administrative workflows, academic processes, and stakeholder requirements. Engaging with various stakeholders including administrators, faculty, students, and support staff to understand their needs, challenges, and expectations from the system. Defining the primary objectives and goals of the system, aligning them with the overarching goals of the college or educational institution. Documenting detailed functional requirements by comprehensively

mapping out administrative processes, academic workflows, and data management needs. This involves identifying tasks such as course management, student enrollment, grading, fee management, and resource allocation. Defining user roles within the system (administrators, faculty, students, etc.) and outlining their specific permissions and access levels to different system functionalities. Gathering existing data and analyzing it to understand the nature and scope of information that needs to be managed within the system. This includes student records, course details, faculty information, and administrative data. Evaluating the technological infrastructure needed to support the system, considering factors such as scalability, compatibility with existing systems, security requirements, and data storage capabilities. Documenting all gathered requirements, including user stories, use cases, workflow diagrams, and functional specifications. This documentation serves as a blueprint for system development and guides subsequent project phases.

3.2 Database Design:

Meticulous planning and development of a robust database schema tailored to accommodate the intricacies of academic environments. This involves creating tables, establishing relationships between entities, and ensuring data integrity.

3.2.1 Entities and Relationships: Identify key entities like students, faculty, courses, departments, and administrative staff. Define relationships between these entities, such as a student enrolling in courses, faculty teaching specific courses, and departments managing courses (refer fig 3.2).

3.2.2 Database Tables: Create tables for each entity, ensuring they represent distinct data entities in the system. For instance, tables for students, courses, faculty, departments, and administrative staff.

3.2.3 Attributes and Fields: Define attributes or fields for each table, representing specific data elements. For example, student tables may include fields for student ID, name, contact details, and enrollment status.

3.2.4 Primary Keys and Foreign Keys: Designate primary keys for each table to uniquely identify records. Establish foreign keys to establish relationships between tables, ensuring data integrity and coherence.

3.2.5 Normalization: Apply normalization techniques to minimize redundancy and dependency issues in the database. Normalize data structures to ensure efficient storage and maintenance.

3.2.6 Data Integrity Constraints: Implement constraints such as NOT NULL, UNIQUE, and CHECK constraints to maintain data accuracy and consistency.

3.2.7 Indexing and Performance Optimization: Strategically use indexing to enhance data retrieval speed and optimize database performance, especially for frequently accessed data.

3.2 8 Scalability and Flexibility: Design the database structure to accommodate future expansions or modifications in the system, ensuring scalability and adaptability to evolving needs.

3.3 User Registration and Authentication:

Implementing features for user registration, login authentication, and defining access permissions based on roles within the institution.

3.4 User Interface Development:

Designing a user-friendly interface for easy navigation and interaction, prioritizing accessibility for various stakeholders like administrators, faculty, and students.

3.5 Administrative Tools:

Creating tools for administrative tasks such as managing departments, courses, faculty information, student records, grades, attendance, and fee management.
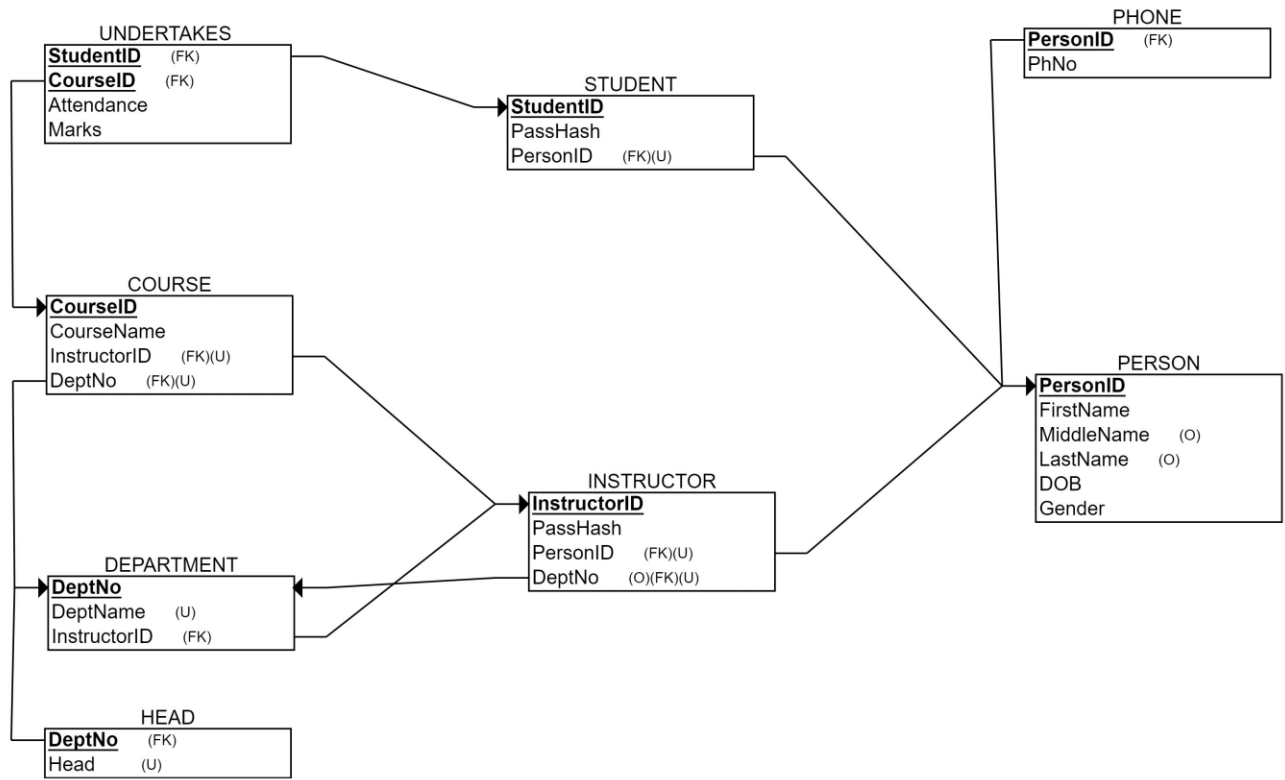
3.6 Analysis:

- College has several departments.
- College has several instructors.
- Several instructors can work in one department.
- An instructor can work in only one department.
- Every department has a head who is an instructor.
- An instructor can head only one department.
- Each department can offer any number of courses.
- An instructor can only take a course offered by his department.
- Each instructor can take any number of courses.
- A course can be taken by only one instructor.
- College has several students.
- A student can enroll for any number of courses.
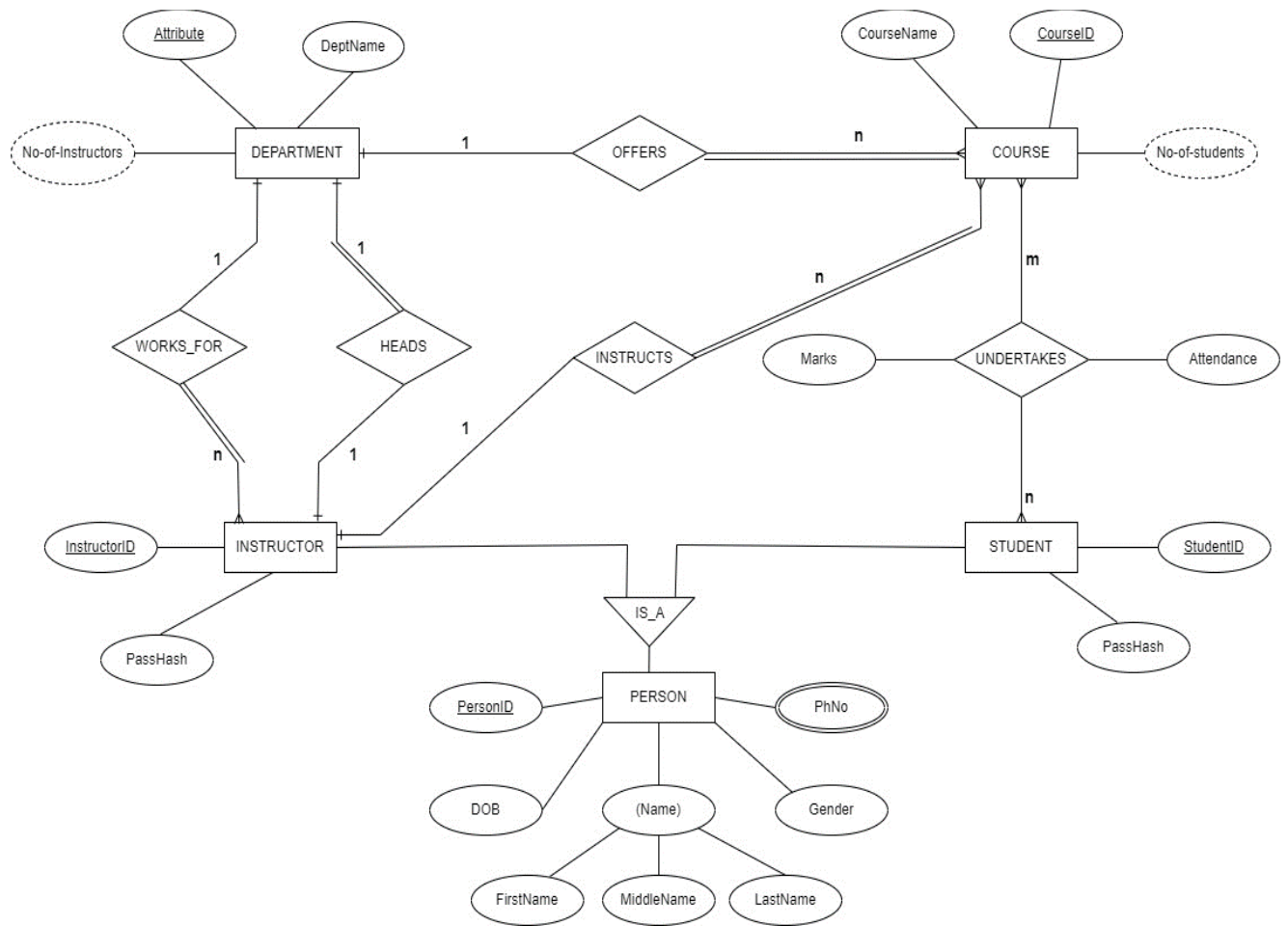- Each course can have any number of students.

3.7 Application :

● Each user can login using respective ID and password.

● Privileges:

    ○ Administrator

- Admin can **view** all the students enrolled in a course. Admin can **edit** the personal details of student (name, gender).Admin has the privilege of **enrolling** a new student.
- Admin can **view** all the Instructors and their current department . Admin can also **change** the department of a faculty.
- Admin can **view** all the departments and the courses in that department .Admin can also **change** the **name** of the department. Admin has the privilege to **create** a **new department** and assign a HOD to it. Admin can also assign a new HOD to a department.

    ○ Instructors can **edit** attendance and marks of students in a course. If Instructor is **HOD** then the instructor can also **edit** the name of a course and change the faculty teaching that subject.

    ○ Students can **view** their attendance and marks in each course.

3.8 Relational Schema :

UNDERTAKES
- **StudentID** (FK)
- **CourseID** (FK)
- Attendance
- Marks

STUDENT
- **StudentID**
- PassHash
- PersonID (FK)(U)

PHONE
- **PersonID** (FK)
- PhNo

COURSE
- **CourseID**
- CourseName
- InstructorID (FK)(U)
- DeptNo (FK)(U)

INSTRUCTOR
- **InstructorID**
- PassHash
- PersonID (FK)(U)
- DeptNo (O)(FK)(U)

PERSON
- **PersonID**
- FirstName
- MiddleName (O)
- LastName (O)
- DOB
- Gender

DEPARTMENT
- **DeptNo**
- DeptName (U)
- InstructorID (FK)

HEAD
- **DeptNo** (FK)
- Head (U)

(fig 3.1)

3.9 ER Diagram :

(fig 3.2)

Table:

DEPARTMENT

DeptNo (PK)	DeptName

HEAD

DeptNo (PK)	Head (FK)

PERSON

PersonID(PK)	FirstName	MiddleName	LastName	DOB	Gender

PHONE

PersonID (PK,FK)	PhNo

INSTRUCTOR

InstructorID(PK)	PassHash	PersonId (FK)	DeptNo (FK)

COURSE

CourseID (PK)	CourseName	DeptNo (FK)	InstructorID(FK)

STUDENT

StudentID (PK)	PassHash	PersonID (FK)

UNDERTAKES

StudentID(PK,FK)	CourseID(PK,FK)	Attendance	Marks

4.Results and Discuss

The college management system has been successfully implemented .The application opens up to a login screen. Users enter their respective ID, password.

Each kind of user has their respective page. The student's page lists information about the student as listed in Person table, and followingly lists information about his/her undertaken courses, attendance, and the marks obtained in it.

The instructor's home page is similar to the students'. Apart from his/her information, it lists information about the courses he instructs. For every course there is a button to add attendance and marks of students in it. Clicking on such one button directs to list of students in the respective course, followed by fields to enter the attendance, or marks obtained per student.

The administrator's page opens up to a few buttons controlling the state of the database . Editing is similar as instructors'. There is a respective list and corresponding fields. He/she can look up discrete and derived information about departments, courses, instructors, and students. Every user can also see the exam schedule.

5.Summary and conclusions

The Online College Management System project is a comprehensive initiative aiming to revolutionize how educational institutions manage both administrative and academic aspects. Its primary objective is to construct an integrated digital platform that optimizes college operations, streamlines administrative tasks, and ensures easier access to academic information.

This project streamlines college operations by creating a unified system that centralizes administrative tasks, ensures seamless communication, and offers a user-friendly interface. It focuses on meticulous database design, tailored for academic intricacies, with features like user registration and stringent security measures. Ultimately, it aims to modernize academic institutions by enhancing efficiency, data accuracy, and organization, adaptable to evolving needs and technological advancements.

In conclusion, the Online College Management System project represents a significant leap in modernizing academic institutions. It introduces a centralized platform that optimizes administrative workflows, enhances data accuracy, and organizes academic information systematically.