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Departmental Web Portal

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Abstract: ***The departmental portal is that the raising content of internet sites for colourful associations is well known. Here and now, a well-planned digital plan plays a suggestive role in an institution's marketing strategies especially considering the youthful generations ' growing dependence on technology. The Departmental portal using MERN stack and Sanity.io is a web-based application designed to manage the administrative tasks of a college. It is built using MongoDB, Express.js, React.js, and Node.js. The system provides a platform for students, teachers, and administrators to manage academic and non-academic tasks. During this paper, we talk about the models submitted by our team such as student registration, Notes management, faculty management, Event management, and Project management. The MERN stack sanity.io provides a powerful and scalable platform for building this system, allowing for efficient data management and real-time updates. With its user-friendly interface and extensive functionality, the departmental portal using MERN stack and sanity.io is a comprehensive solution for colleges looking to streamline their administrative processes.***

Keywords: Authentication, rest API, Sanity io, MERN Stack, Scalability, Data security

I. INTRODUCTION.

The departmental portal is developed to disallow the issues that are common in the department manual system. This Portal is carried out to get rid of and in some instances decrease the afflicted by this current system. Moreover, this system is designed for the particular need of the department to carry out operations smoothly and effectively. HTML, CSS, and Javascript are the foundation of Website progression but aren't long-lasting sufficient to bear out all the new challenges. So we will be using MERN Stack and sanity.io to develop the Portal. MERN stack is a popular web development technology stack that includes four main components: MongoDB, Express.js, React.js, and Node.js.

1) MongoDB is a NoSQL database that allows developers to store and retrieve data in a flexible and scalable way.
2) Express.js is a Node.js web operation framework that provides a block of tools and features to construct web operations facilely and efficiently.
3) React.js is a JavaScript library that allows developers to build UI components in a declarative and efficient way.
4) Node.js is a JavaScript runtime environment that allows developers to execute JavaScript code on the server side.

And another technology we are using is Sanity.io:
Sanity.io is a flexible, fully customizable content management system (CMS) and real-time database that allows users to create, manage, and deliver digital content across multiple platforms and channels. It provides a highly customizable and developer-friendly environment that allows teams to collaborate and build complex digital experiences without having to worry about the backend infrastructure. In this, we Are using sanity.io to manage the department data, and student data such as placements, achievement, topper list, etc. Together, these two technologies MERN stack and sanity.io form a powerful and flexible system that enables developers to build full-stack web applications quickly and efficiently. With the MERN stack and sanity.io, developers can use JavaScript for both front-end and back-end development, which makes the development process smoother and more streamlined. This portal contains three modules: Admin, faculty, and student login module Users can go through our portal and access the services offered by the Admin. Through the Faculty and student panel.

II. PROBLEM STATEMENT

Currently, colleges do not have separate departments portals are inefficient and lack integration, resulting in challenges such as data redundancy, inaccurate data, delayed processes, and reduced productivity. These challenges arise due to the use of multiple standalone applications, manual processes, and limited system capabilities. As a result, departments experience difficulties in managing academic and administrative tasks, leading to delays in academic progress, decreased student satisfaction, and decreased staff productivity.

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Therefore, there is a need for an efficient and integrated department portal that provides a centralized platform for managing academic and administrative tasks, automating processes, and improving communication and collaboration among students, faculty, and staff. The objective of this research paper is to propose a department portal using MERN stack and Sanity.io that addresses the current challenges and provides an efficient and integrated solution for college management.

III. THE OBJECTIVE OF THE PROJECT

The objective of the department portal project for a research paper is to design and develop a comprehensive and integrated system that enables efficient management of academic and administrative tasks in a college setting. The proposed system should provide a user-friendly interface and streamline processes, thereby improving productivity and reducing errors. Specifically, the objectives of the project are

1) To design a system that enables easy student registration, note management, Events management, project management, and faculty management.
2) To develop a system that provides efficient Admin management, including, adding faculty and registering the student, and uploading and deleting the data from the portal
3) To develop a system that provides efficient faculty management, including faculty uploading the notes allocation, and performance assessment.
4) To create a system that enables efficient student management, including accessing the notes and assignments, which can refer to the project idea.
5) To create a system that enables efficient department virtual tours in a 360-degree view

Overall, the objective of the departmental portal project is to propose an efficient and integrated solution that addresses the current challenges faced by the department in managing academic and administrative tasks.

IV. SCOPE FOR DEVELOPMENT OF THIS PROJECT.

The user requires to:

1) The user must log in to the college network.
2) access/ search department information.
3) Log in to the system through the login page of the application using the registration no and password
4) There are three types of login modules Admin, Student, and Faculty
5) Faculty and student can change the password
6) Admin can edit or delete the data of this portal
7) Admin/faculty/student View his/her details.

V. LITERATURE REVIEW

For this department portal project, we are referring to the college management systems. paper. The use of college management systems has become increasingly popular in recent years due to the growth of educational institutions and the need for efficient management of academic and administrative tasks. Various studies have been conducted on the design, development, and implementation of college management systems.

1) A study by Deepali. S. Bhor, Vaibhav. V. Bhosale, Priyanka. K. Kharatma proposed a College Management System in 2022 this research paper discusses the benefits of implementing a College Management System, which includes simplifying and speeding up management processes that are currently done manually. The proposed system will store data on a college server, making it more reliable, secure, and easy to control. The system will also describe the workload of the admin and faculty, bringing more efficiency to their work. Overall, the system will offer convenience and time savings for admin, faculty, and students. The result of this research paper will describe the benefits of the proposed system and the improvements it brings to the management process.
2) In another study, by Lalit Mohan Joshi College Management System in 2015 this research paper discusses the development of an Online Intranet College Management System (CMS) that can be accessed throughout an educational institution or a college. The system allows for monitoring attendance and accessing information about the college. The project is designed to address the day-to-day problems faced by a college, and it has been successfully implemented with all the features outlined in the system requirements specification. The result of this research paper will describe the College Management System project and its benefits for institutions, students, and staff.

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3) A study by Sanchit Aggarwal research paper in React.js in 2018 this research paper discusses the features and benefits of ReactJS, a component-based library used for developing interactive user interfaces. It is widely used and supported by Facebook, Instagram, and a community of developers and organizations. ReactJS enables the development of large and complex web-based applications, which can change data without refreshing the page, resulting in better user experiences and fast and robust web app development. It can also be integrated with other JavaScript libraries or frameworks. Despite a few minor disadvantages, ReactJS is considered a game changer in modern web development, which is becoming more dynamic and user interactive, with evolving user experience design trends. The result of this research paper will describe the advantages of ReactJS and its role in modern web development.
4) A study by Cornelia GYŐRÖDI, Robert GYŐRÖDI, George PECHERLE, Andrada OLAH research paper MongoDB vs. MySQL in 2015 this research paper discusses a comparative study of non-relational databases and relational databases, with a focus on MongoDB and MySQL as examples. The paper aims to justify why MongoDB is more efficient than MySQL and presents the advantages of using a non-relational database in a forum for personal and professional development. However, the switch from a relational to a non-relational database can be challenging, and careful consideration must be given to find the optimal solution for the specific application. While non-relational databases offer advantages, relational databases provide unparalleled features, such as maintaining data integrity and scalability, and will continue to be useful. The result of this research paper will describe the pros and cons of both types of databases and their suitability for different applications.
5) A study by Sanchit Aggarwal, and Jyoti Verma research paper for analysis of the MEAN stack and MERN stack in 2018 this research paper compares two popular technology stacks used for developing modern web applications: MEAN (MongoDB, ExpressJS, AngularJS, NodeJS) and MERN (MongoDB, ExpressJS, ReactJS, NodeJS). Both stacks utilize JavaScript, which streamlines development and reduces costs. The paper analyzes the features, advantages, and disadvantages of each stack and offers insights on how to select one over the other. The author acknowledges the support of their mentor and family in pursuing this research.
6) A study by Dipina Damodaran, Shirin Salim, and Surekha Marium Vargese interpretation assessment OF MYSQL AND MONGODB DATABASES in 2016 this research paper discusses the concept of databases and the difference between relational and non-relational databases. The paper focuses on the performance evaluation of MySQL and MongoDB, with MySQL being a relational database and MongoDB being a non-relational database. The evaluation is performed on a hypermarket application, and the results suggest that MongoDB outperforms MySQL when the number of records is larger. Thus, MongoDB can be preferred for better performance in such cases.

VI. METHODOLOGY

The following is a general methodology that can be followed to develop such a system:

A. *Specifications*

The software and hardware specifications for developing a Departmental Portal can vary depending on the specific requirements of the system, but the following are some general guidelines:

1) *Software Specifications*
a) Operating System: Windows or Linux
b) Integrated Development Environment (IDE): Visual Studio Code, Atom, or Sublime Text for code development.
c) Database: MongoDB for database management.
d) Backend Development: Node.js and Express.js for server-side development.
e) Frontend Development: React.js for client-side development.
f) Headless CMS: Sanity.io for content management.
g) Version Control: Git for code versioning and collaboration.
h) Web-Server: Xampp allows users to create a web server environment on their local machine

2) *Hardware Specifications*
a) Processor: Intel Core i5 or higher.
b) RAM: 8 GB or more.
c) Storage: 256 GB SSD or higher.
d) Display: 15-inch monitor with 1920x1080 resolution.

e) Input devices: Keyboard and mouse.
f) Internet connectivity: Broadband internet connection for development

B. System Architecture

1) Activity Diagram For Departmental Portal

This is the Activity UML diagram of the departmental portal which shows the flows between the activity of Admin, academic, students, virtual tour, login, department, Events, Faculties. The main activity involved in this UML Activity Diagram of the departmental portal fig.6.2.1 are as follows:

a) Login to the college network: To access this portal we must connect to the college network using a given username and password. Then visit the given IP to access the portal.
b) Home component: In this section, it contains details about the college department, vision mission, and pictures.
c) HoD Profile component: detail about the head of the department.
d) Faculties component: there are 2 sections,
- Teaching staff: in this user can see all teaching faculties that belong to the department and it shows details about all faculties.
- Non-Teaching: It includes all non-teaching staff members.

e) Academic component: in this, all of the academic information is given like the academic calendar and academic timetables, it also contains academic information like program offer details, PEOS, POS, and PSOS.
f) Events component: we cover the info about forums and events which are organised by our forums.

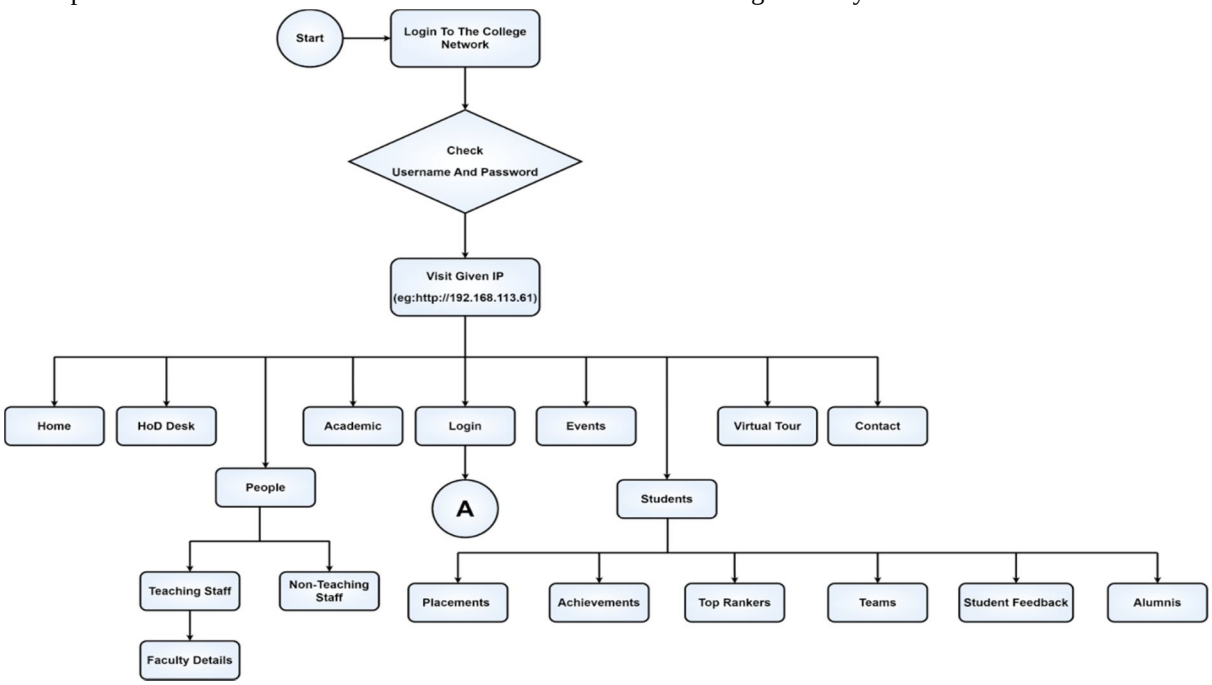

Fig.6.2.1: Activity Diagram For departmental portal

3) Student component: this component is divided into 6 sections as follows
- Placements.
- Achievements.
- Top Rankers.
- Teams.
- Student Views.
- Alumnus.

4) Virtual Tour component: it gives a 360-degree view of the department
5) Contact Component: it shows contact details about the department. as shown in Fig. 6.2.1

2) Login Activity Diagram For the departmental portal

In this portal there er 3 login modules as follow:

a) Admin Module: Admin will log in to the portal using their registration no and password.

b) Faculty Module: Faculty will log in to the portal using their registration no and password.

c) Student Module: Students will log in to the portal using their registration no and password. As shown in the fig.6.2.2

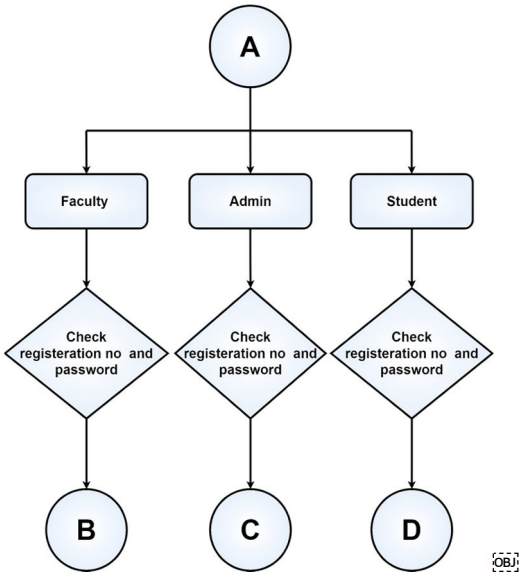

Fig.6.2.2: Login Activity Diagram For departmental portal

3) Admin Login Activity Diagram For departmental portal:

After login through the admin module the admin can manage the 7 seven components

a) Manage Faculty: in this admin can add/view faculty of the department.

b) Manage Student: in this admin can add/view department students.

c) Manage Academic Information: in this admin can add/view/edit the Academic info of the department

d) Manage Events: in this admin can add/view/edit/delete Events organised by the forum and department, it also shows detailed information about the events.

e) Manage Project: in this admin can add/view/edit/delete the Project of the student, it also shows detailed information about the project.

f) Manage Notes: in this admin, the admin can add/view/edit/delete Notes of the subject and the student can download the notes. as shown in Fig.6.2.3

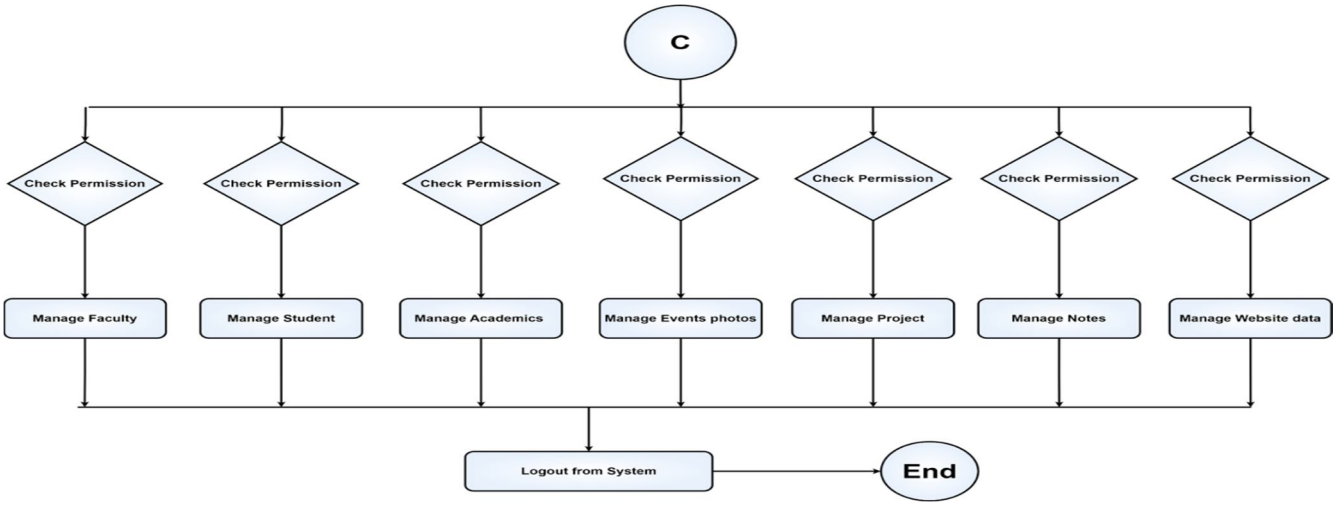

Fig.6.2.3:Admin Login Activity Diagram For departmental portal

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4) Faculty Login Activity Diagram For Departmental Portal

After login through the Faculty module the Faculty can manage the 4 components,

a) Manage Events: in this Faculty can add/view/edit Events organize by forum and department, it also shows detailed information about the events.

b) Manage Project: in this Faculty can add/view/edit the Project of the student, it also shows detailed information about the project.

c) Manage Notes: in this Faculty can add/view/edit Notes on the subject and students can download the notes.

d) Manage Password: faculty can update the password. as shown in Fig.6.2.4

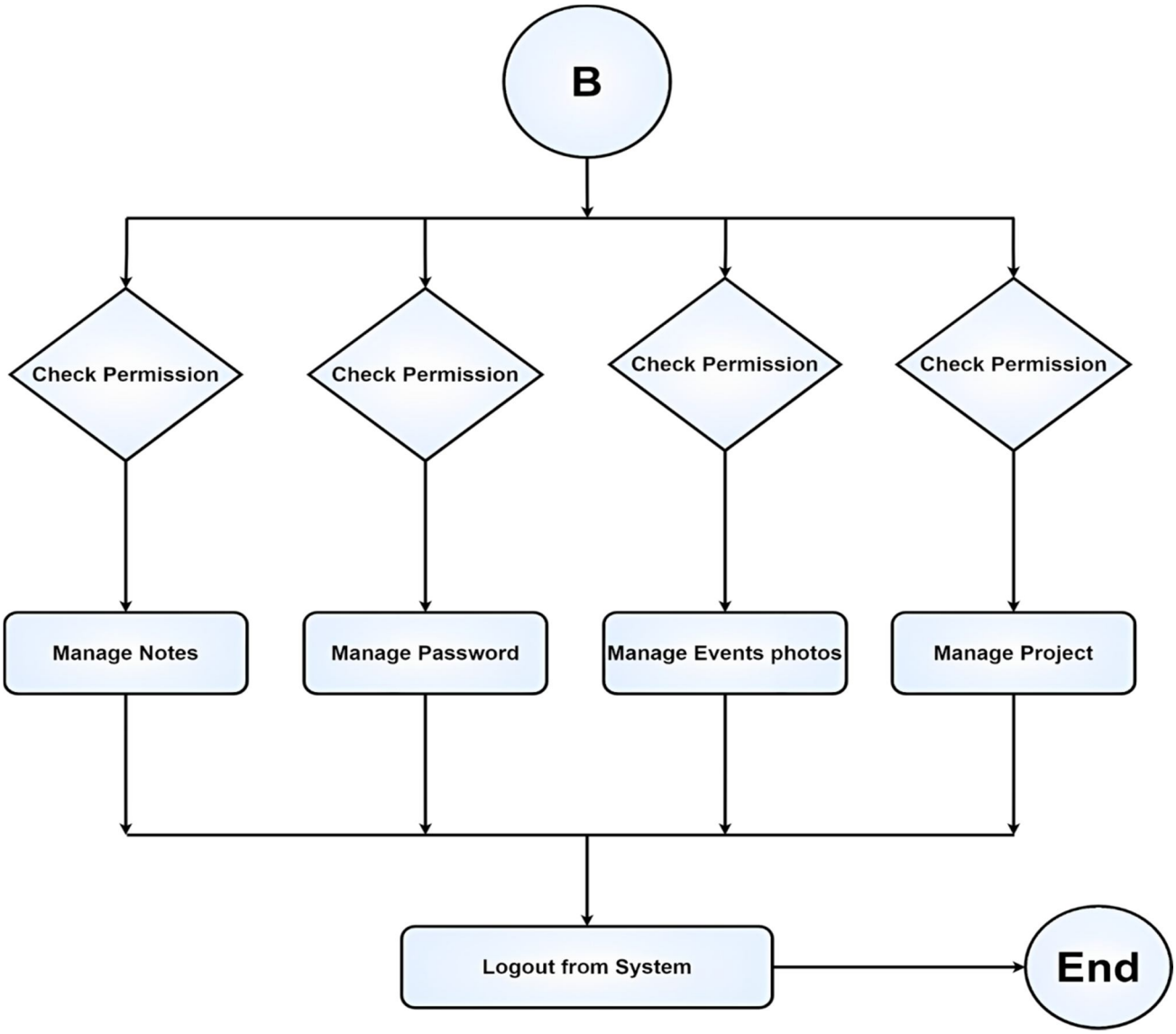

Fig.6.2.4:Faculty Login Activity Diagram For departmental portal.

5) Student Login Activity Diagram For Departmental Portal

After login through the Student module the Student can manage the 4 components

a) View Events: in this Student can view Events organized by forum and department, it also shows detailed information about the events.

b) View Project: In this Student can view the project of the student, and it also shows detailed information about the project.

c) View Notes: in this Students can view Notes on the subject and students can download the notes.

d) Manage Password: Students can update their password. as shown in Fig.6.2.5

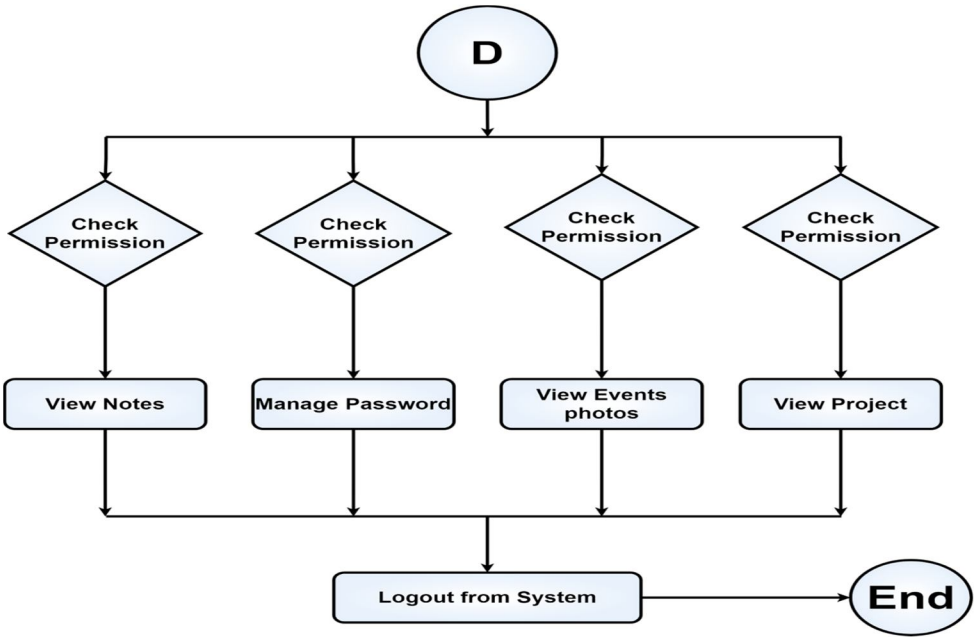

Fig.6.2.5:Student Login Activity Diagram For departmental portal.

6) Login Flowchart Diagram For Departmental Portal

This is the flowchart of login Activity of the departmental portal, which shows the flows of Login Activity, where admin, faculty, and students will be able to log their registration no and password. if the user enters the wrong registration no and password it shows the error otherwise user will log in successfully After login user can access the internal functionality according to their permission.as shown in the fig.6.2.6

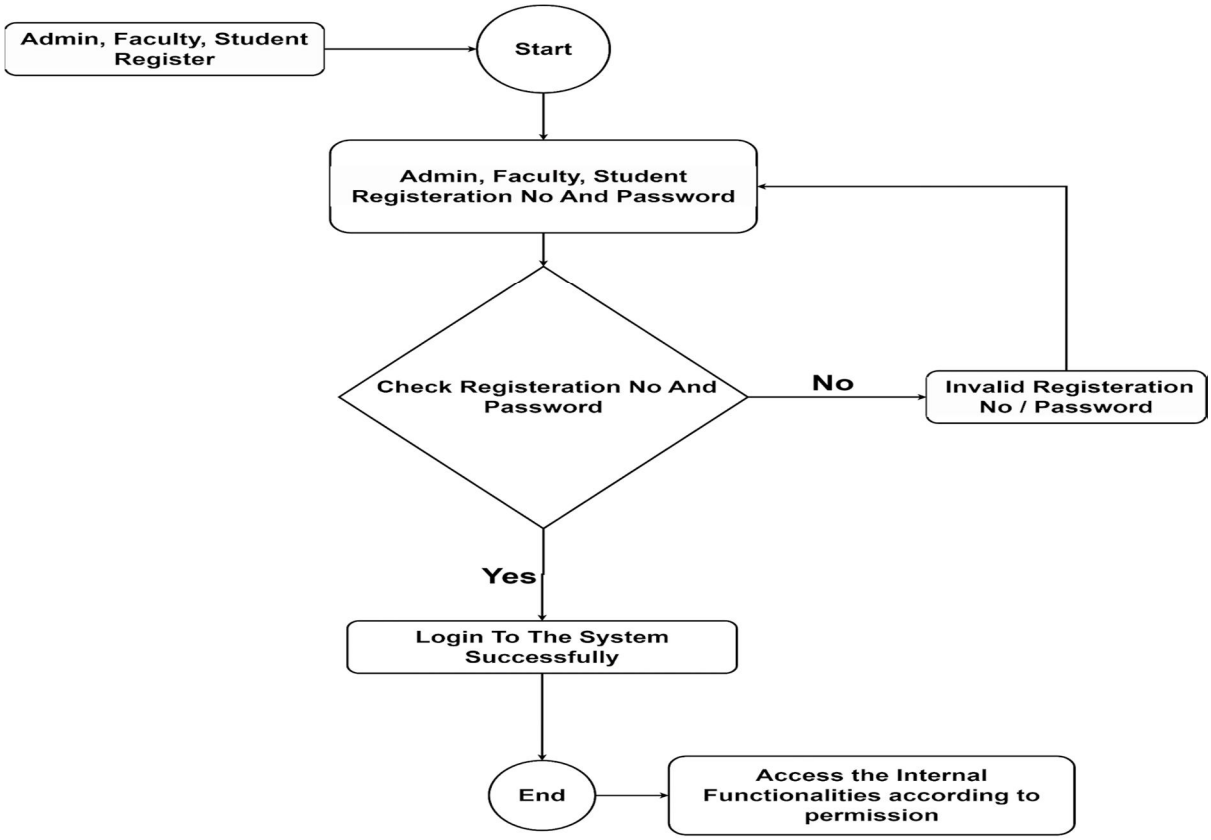

Fig.6.2.6: Login Flowchart For departmental portal.

7) Data Flow Diagram For Departmental Portal

The Data Flow Diagram (DFD) is a graphical representation of the flow of data within the system, which shows how data moves from one process to another, how it is stored, and how it is used. The DFD for a departmental portal is a hierarchical representation of the system, consisting of multiple levels of diagrams. The highest level, Level 0, represents the system as a single process, with external entities (like students, faculties, and administrators) interacting with the system. The lower levels provide more detailed views of the processes and data flows within the system.

C. Zero Level Data Flow Diagram(0 Level DFD) Of the Departmental Portal

The Level 0 DFD diagram represents the entire Departmental portal as a single process. It shows the high-level view of the system and the external entities that interact with it. The main purpose of the system is to manage the Department's various operations and activities, including student and faculty management, Notes management, Events management, Project management, and manage website data.

The arrows indicate the flow of data between the external entities and the system. For example, Admin will provide student's data such as their details, etc to the system, and the system provides them with various services such as Notes, registration, etc.

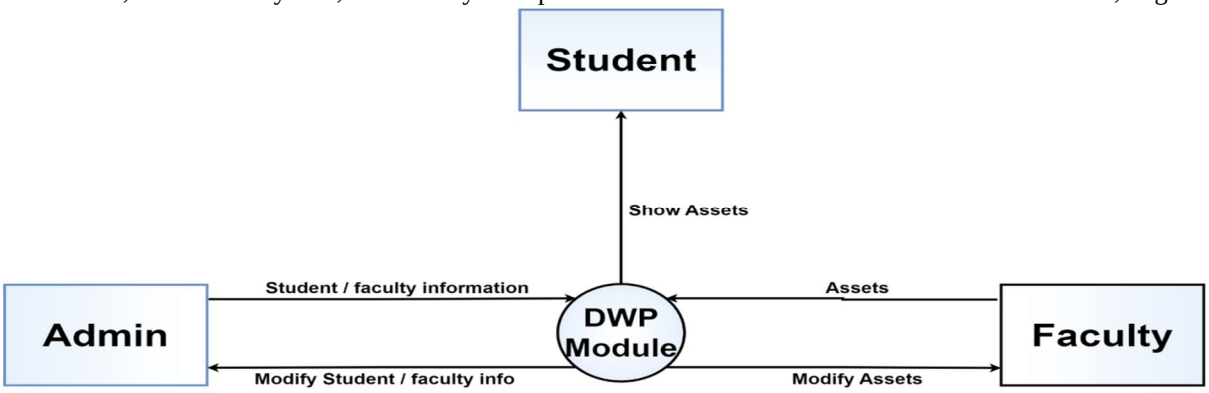

Fig.6.2.7: Zero Level DFD - Departmental portal.

1) Fig.6.2.7, This admin entity provides information to the system, and the system updates and returns the information provided by the admin.
2) Next, the faulty entity will add assets to the system, and the system will update and modify the assets.
3) Finally, the system will display the assets to the student entity.

D. First Level Data Flow Diagram(1 Level DFD) Of Departmental Portal concerning Admin

(Fig.6.2.8)The Level 1 DFD diagram shows the Departmental portal as a collection of high-level processes that are responsible for managing various aspects of the college. These processes are:

1) Student Management: This process manages student-related information, including personal details, and stores it in the database then the system will provide services such as registration numbers, and access the internal functionality according to the permission.
2) Faculty Management: This process manages Faculty-related information, including personal details, and stores it in the database then the system will provide services such as registration numbers, and access the internal functionality according to the permission.
3) Notes Management: This process manages the creation, sharing, and archiving of notes and other learning materials, including lectures, presentations, and reference materials.
4) Academic Information Management: This process manages academic-related information, including curriculum, academic policies, and accreditation-related information.
5) Project Management: This process manages project-related information, including project proposals, project assignments, progress reports, and final submissions.
6) Event Management: This process manages event-related information, including event proposals, event planning, scheduling, and communication with attendees.

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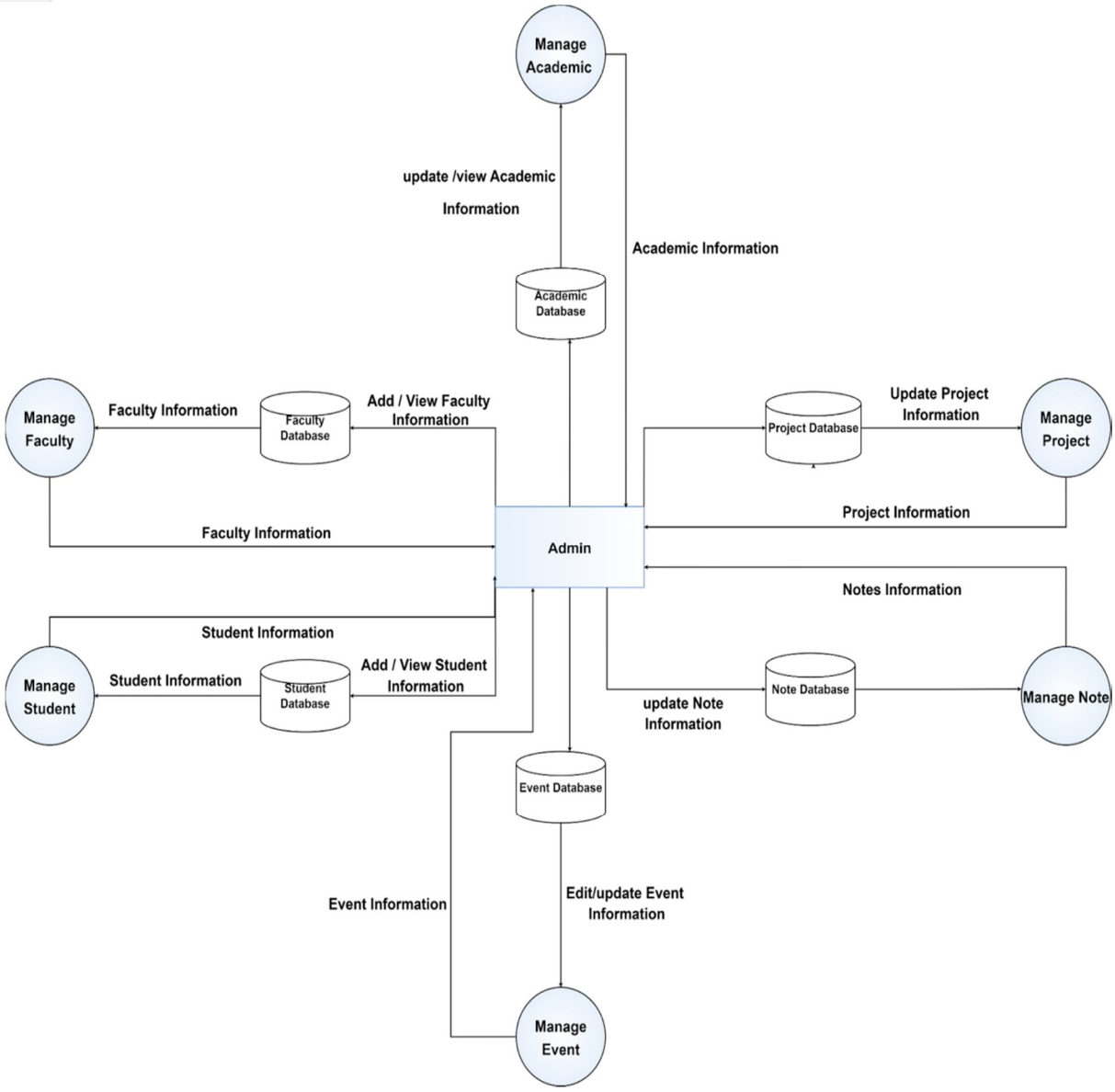


Fig.6.2.8: First Level DFD - Departmental portal concerning Admin.

E. First Level Data Flow Diagram(1 Level DFD) Of Departmental Portal concerning Faculty

(Fig.6.2.9)The Level 1 DFD diagram shows the Departmental portal as a collection of high-level processes that are responsible for managing various aspects of the college. These processes are:

1) Update Password: This process manages the authentication and security of the Departmental Portal by allowing Faculty to update their passwords.

2) Notes Management: Faculty will enter Notes information into a Notes database, which will be shared with managing Notes processes. This information will be sent to the faculty, and the faculty will be able to edit and update Notes information.

3) Academic Information Management: Faculty will enter academic information into an academic database, which will be shared with managing academic processes. This information will be sent to the faculty, and the faculty will be able to edit and update Academic information.

4) Project Management: Faculty will enter Project information into a Project database, which will be shared with managing Project processes. This information will be sent to the faculty, and the faculty will be able to edit and update Project information.

5) Event Management: Faculty will enter Event information into an Event database, which will be shared with managing Event processes. This information will be sent to the faculty, and the faculty will be able to edit and update Event information.

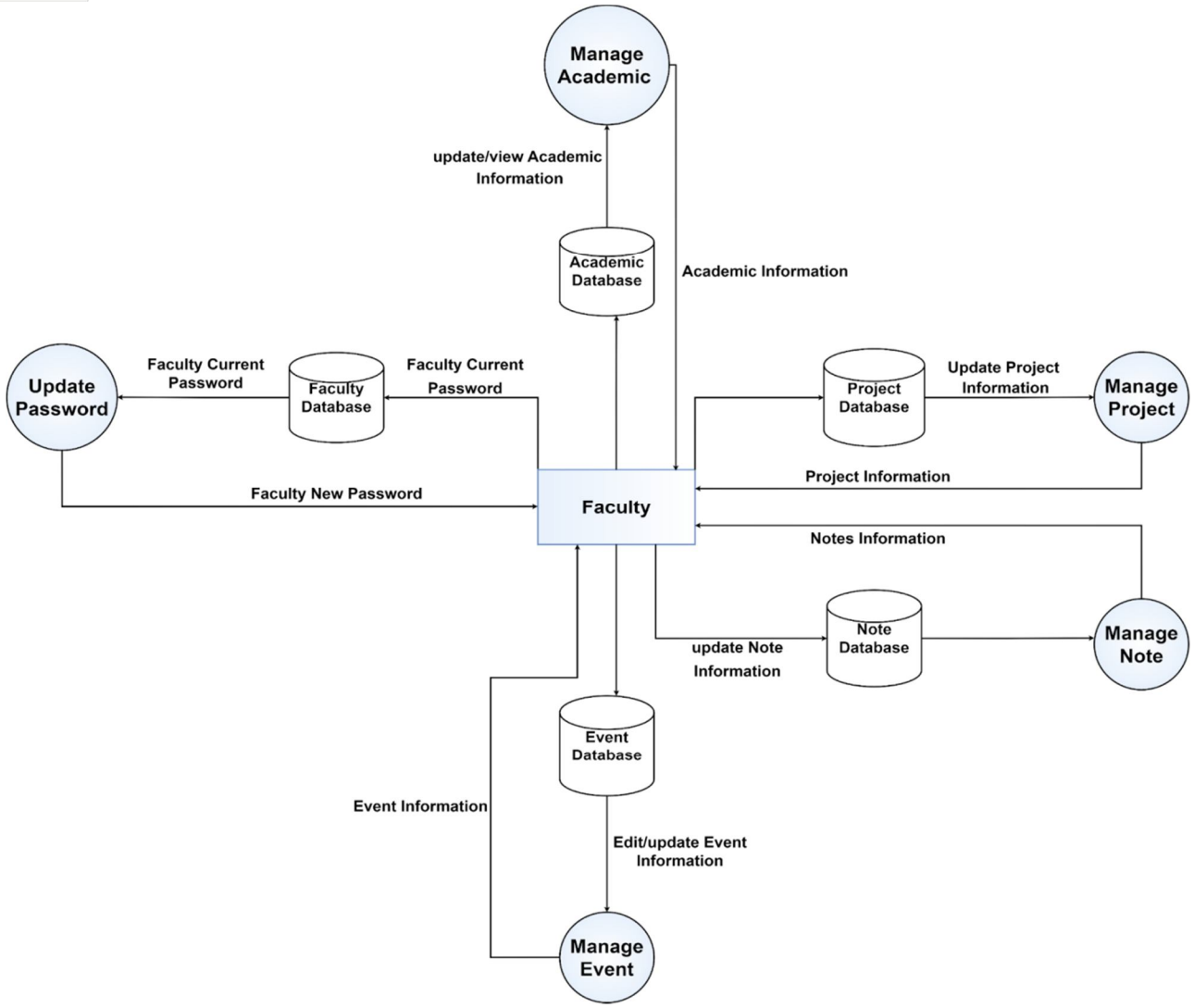


Fig.6.2.9: First Level DFD - Departmental portal concerning Faculty

F. First Level Data Flow Diagram(1 Level DFD) Of Departmental Portal concerning Students:

(Fig.6.2.10)The Level 1 DFD diagram shows the Departmental portal as a collection of high-level processes that are responsible for managing various aspects of the college. These processes are:

1) Update Password: This process manages the authentication and security of the Departmental Portal by allowing Students to update their passwords.

2) Notes Management: Students can search a query or enter Notes information details into a Notes database, which will be shared with managing Notes processes. This information will be sent to Students, and Students will be able to view and download the Notes information.

3) Academic Information Management: Students can search a query or enter Academic information details into an Academic database, which will be shared with managing Academic processes. This information will be sent to Students, and Students will be able to view and download the Academic information.

4) Project Management: Students can search a query or enter Project information details into a Project database, which will be shared with managing Project processes. This information will be sent to Students, and Students will be able to view the Project information and its details.

5) Event Management: Students can search a query or enter Event information details into an Event database, which will be shared with managing Event processes. This information will be sent to Students, and Students will be able to view the Event information and its details.

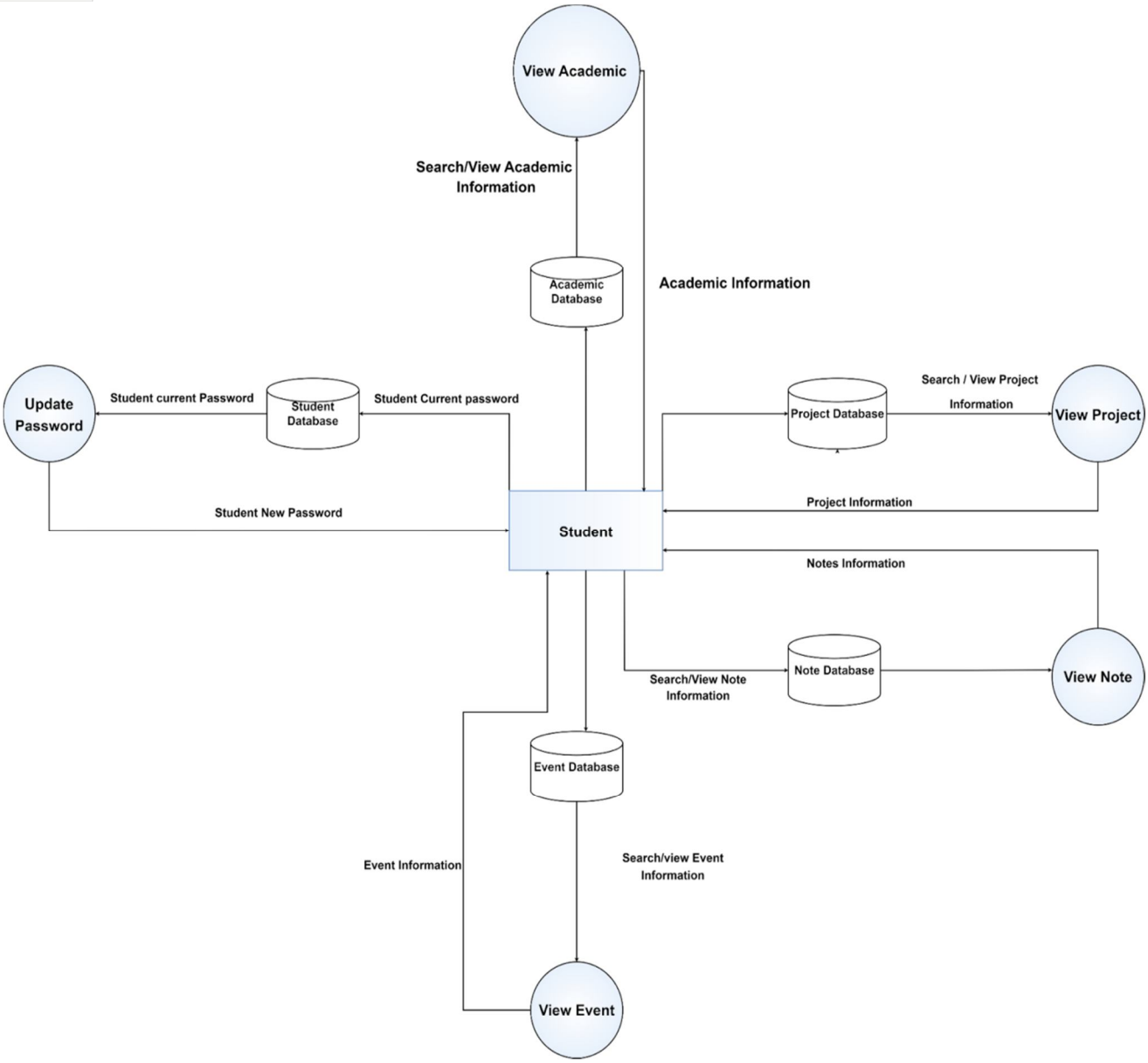


Fig.6.2.10: First Level DFD - Departmental portal concerning Students

G. Use case diagram Of Departmental Portal

A use case diagram for a Departmental Portal that represents the various ways in which actors interact with the system to achieve certain goals or tasks. The primary actors in the Departmental Portal could be students, Faculty, and administrators. The diagram(Fig.6.2.11) consists of use cases, actors, and their relationships.

The connections between and among the actors and the use cases of the Departmental Portal:

1) Admin Entity: Use cases for admin are log in, My Profile, Add Faculty, Add Student, View Faculty, View Student, Add/View Academic information, Add/View Event photos, Add/View Notes, add/view Project, Add Website Data, Update Password, logout.

2) Faculty Entity: Use cases for faculty are log in, My Profile, Add/View Academic information, Add/View Event photos, Add/View Notes, add/View Project, Add Website Data, Update Password, and logout.

3) Student Entity: Use cases for the student are log in, My Profile, View Academic information, View Event photos, view Notes, view Project, Update Password, and logout.

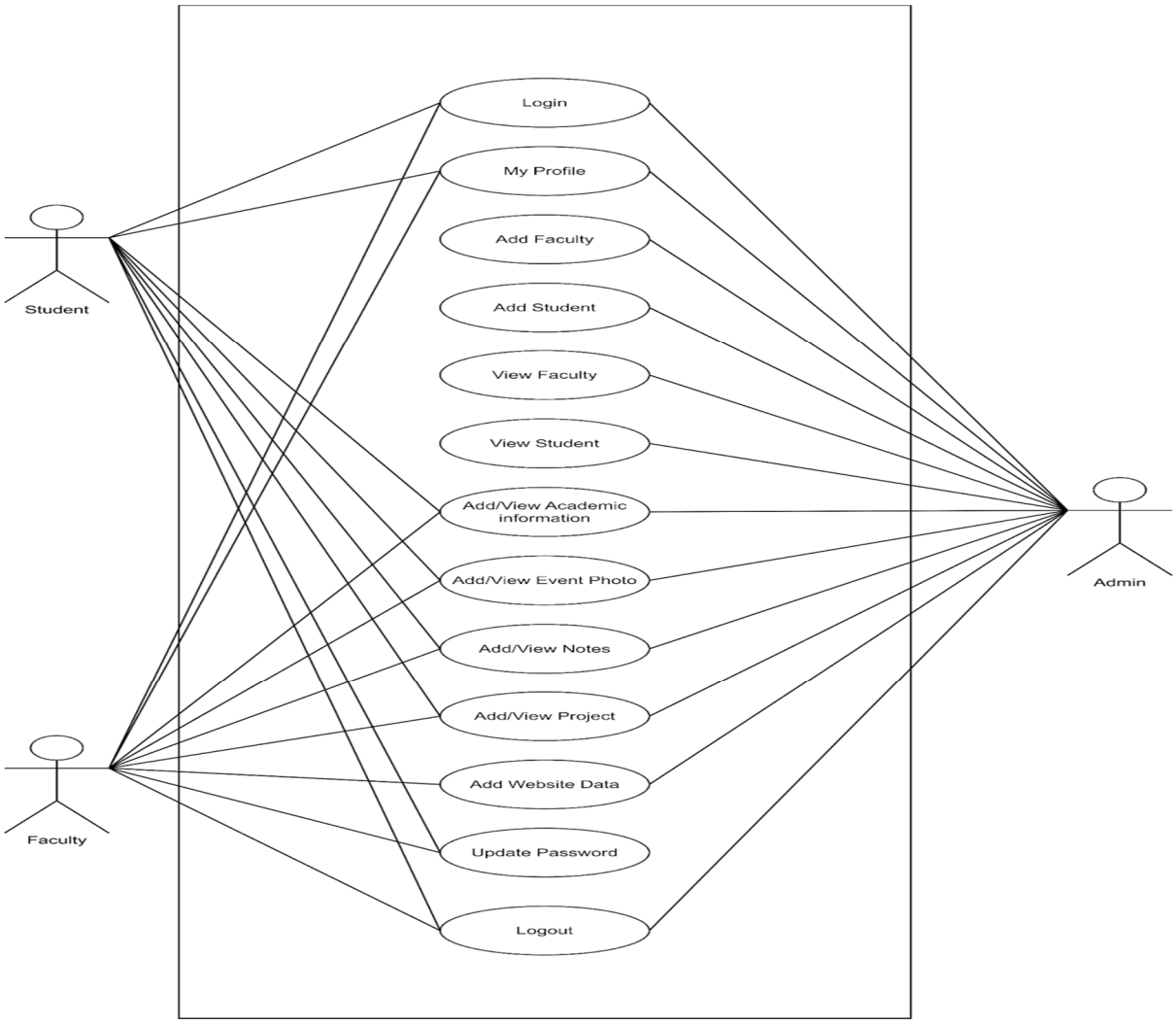


Fig.6.2.11: Use case diagram Of Departmental Portal

H. ER diagram Of Departmental Portal

This ER (Entity Relationship) Diagram demonstrates the Departmental Portal
Entity model. The Departmental Portal entity-relationship diagram demonstrates all of the visuals as well as the relationships between admin, Faculty, Student and so on. It employed structured data to define the linkages between Departmental Portal capabilities. The admin, Faculty, and Student are the primary components of the Departmental Portal.

1) Departmental Portal Entities and their Activities

a) Admin Entity: Attributes of Admin are admin_id, avatar, name, email, joiningYear, registrationNumber, department.

b) Faculty Entity: Attributes of Faculty are faculty_id, email, password, name, gender designation, registrationNumber, Faculty Register JoiningYear, aadharcard, avatar, department, dob.

c) Student Entity: Attributes of Faculty are student_id, email, name, fatherMobileNumber, joiningYear, studentMobileNumber, password, father Name, aadharCard, batch, avatar, department, registration Number, dob.

d) Project Entity: Attributes of Project are Projecttitle, projectguidname, project_id, projectdesc, projectsec, projectmembernameone, projectmembernamethree, projects tags, projectsem, projectdoc, selectedFile, projectmembernamefour projectmembernamefive, projectmembernametwo.

e) Notes Entity: Attributes of Notes are note_id, notetitle, note sem, noteowner, tags notedownloadlink, notesubject.

f) Events Entity: Attributes of Events are events_id, tags, title, creator, message selectedFile.

g) Academic Entity: Attributes of Academic are academicsinfos_id, doc desc, doclink, doctitle, tags.

2) Description of Departmental Portal Database:

a) Each entity (Admin, Faculty, Student, Notes, Events, Academic, Project) contains primary keys

b) There are one-to-one and one-to-many relationships available between Admin, Student, Faculty, and so on.

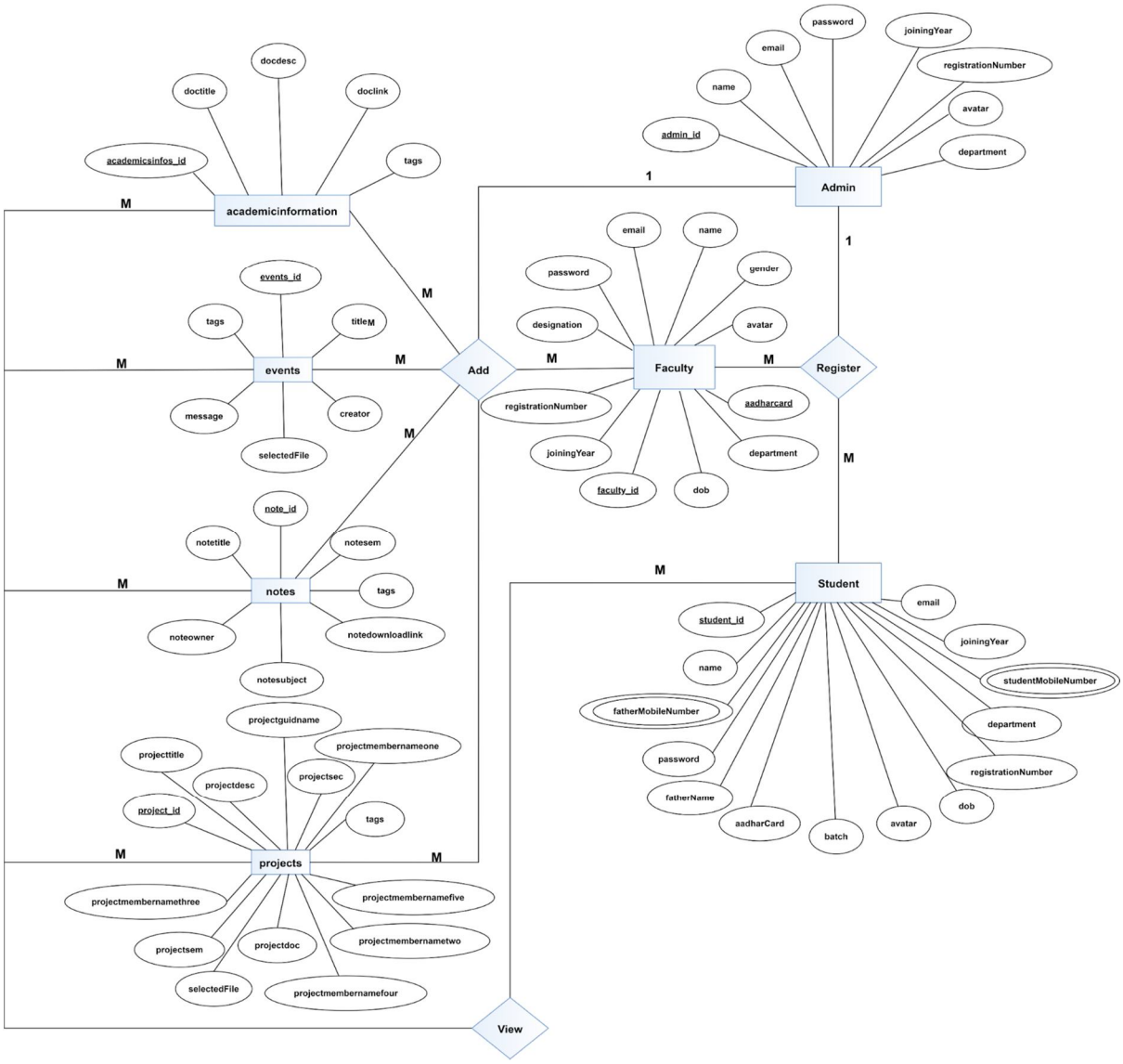


Fig.6.2.12: ER diagram Of Departmental Portal.

VII. FEATURES

There are many features in our departmental web portal such as Student Information Management, Course Management, Events Management, etc. However, we have added some extra features for security purposes, which are as follows:

1) Deployment on Intranet: The project is deployed on our college's intranet. Users must log in to our college network by providing their login credentials to access this portal. This adds an additional layer of security and ensures that only authorized users can access the portal.

2) CORS Policy: Cross-origin resource sharing (CORS) is a standard mechanism that allows JavaScript XMLHttpRequest (XHR) calls executed on a web page to interact with resources from non-origin domains. However, to prevent unauthorized access and protect sensitive data, we have implemented a CORS policy that allows only trusted domains to interact with our portal.

3) Non-visibility of Source Code: To prevent the visibility of the source code in the browser, we have bypassed the methods that allow users to view the source code of a website by right-clicking on the page or pressing "CTRL + U" keys on their keyboard. This helps protect our intellectual property and sensitive data from being copied or modified by unauthorized users.

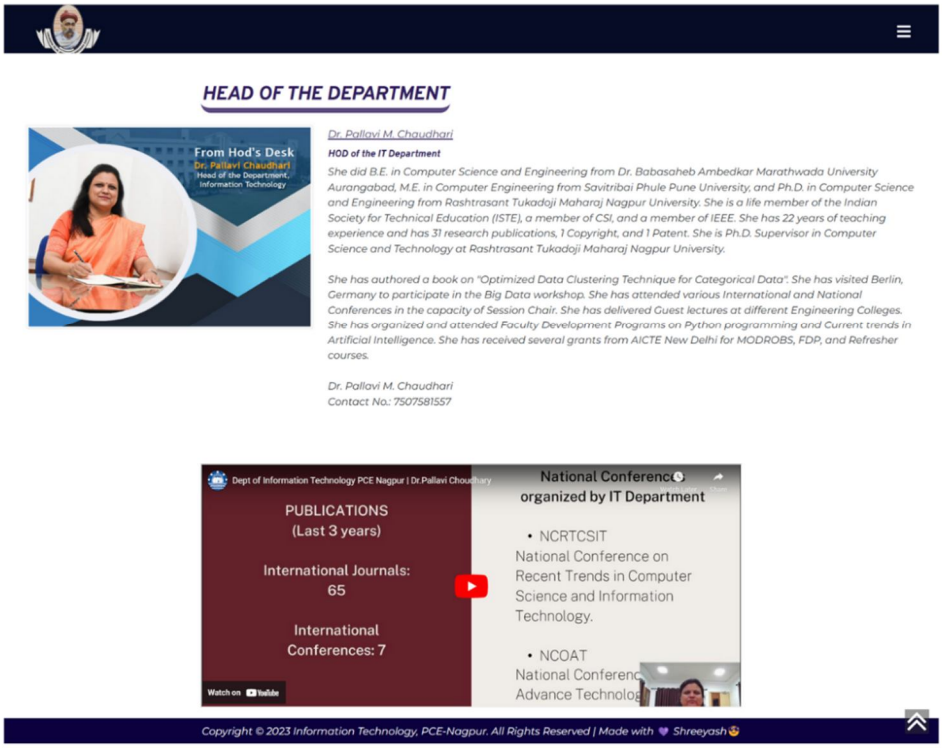
4) *Inspect Element:* Inspect Element is a feature of modern web browsers that enables anyone to view and edit a website's source code, including its HTML, CSS, JavaScript, and media files. To prevent unauthorized access and protect our data, we have bypassed the Inspect Element feature.
5) *Password Security:* The password is secure, and even the admin cannot see the password of other users (faculty and students). The password is secured with bcrypt, a password hashing algorithm designed by Niels Provos and David Mazières based on the Blowfish cipher.
6) *URL Tampering:* Anyone who tampers with the URL will be redirected to a 404 error page. This ensures that only authorized users can access the pages they are authorized to access.
7) *Screenshot Prevention:* Users cannot take screenshots of our portal pages. This helps prevent unauthorized access and protects our data from being copied or modified by unauthorized users.

By implementing these extra security features, we have ensured that our departmental web portal is safe and secure, protecting our intellectual property and sensitive data from being accessed or modified by unauthorized users.

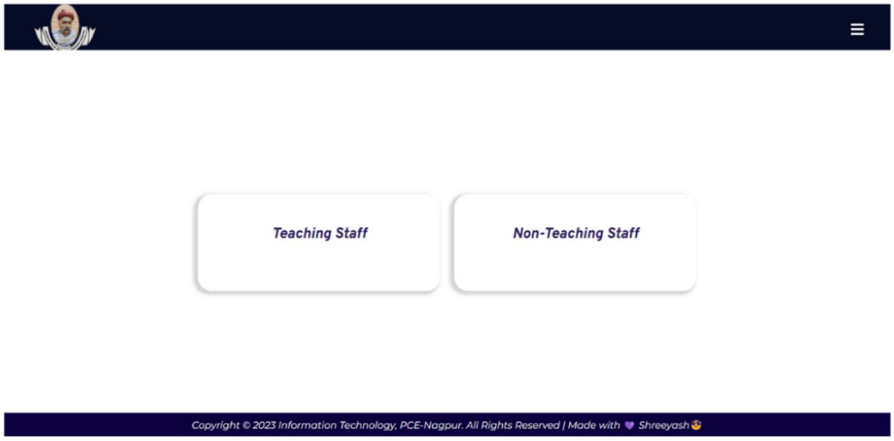
VIII. SNAPSHOT



Home Page



HoD Page



People

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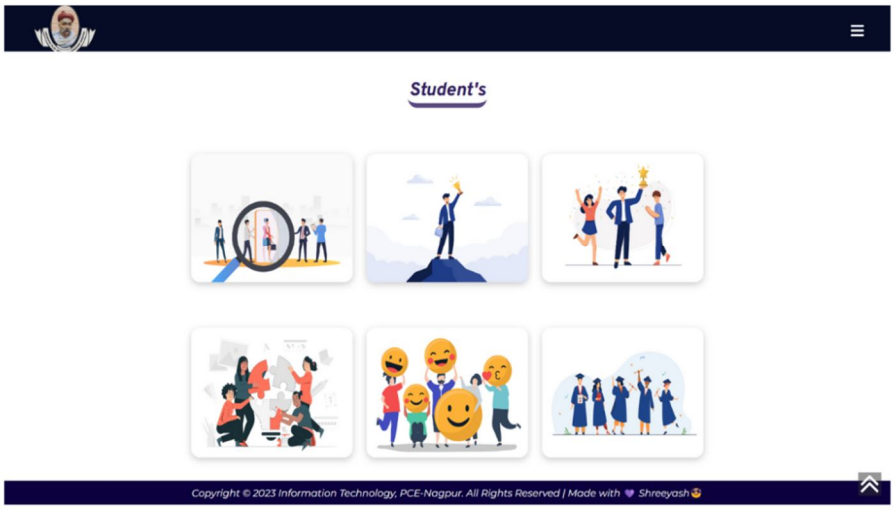
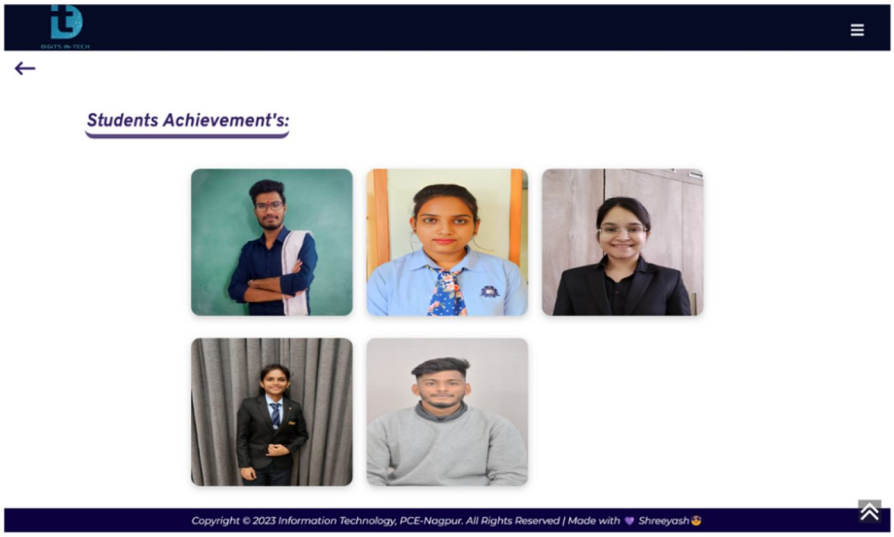
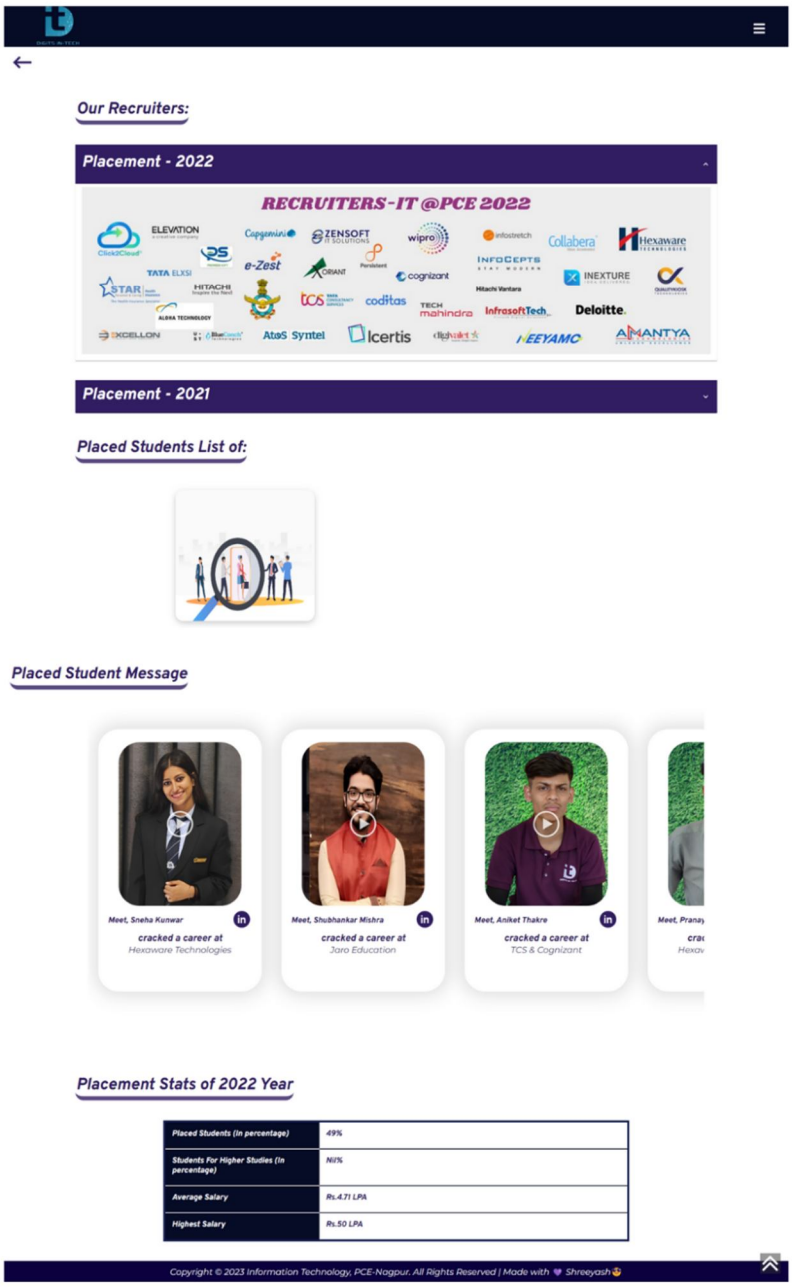


Students Page



Students Achievement's



Placement Section Page

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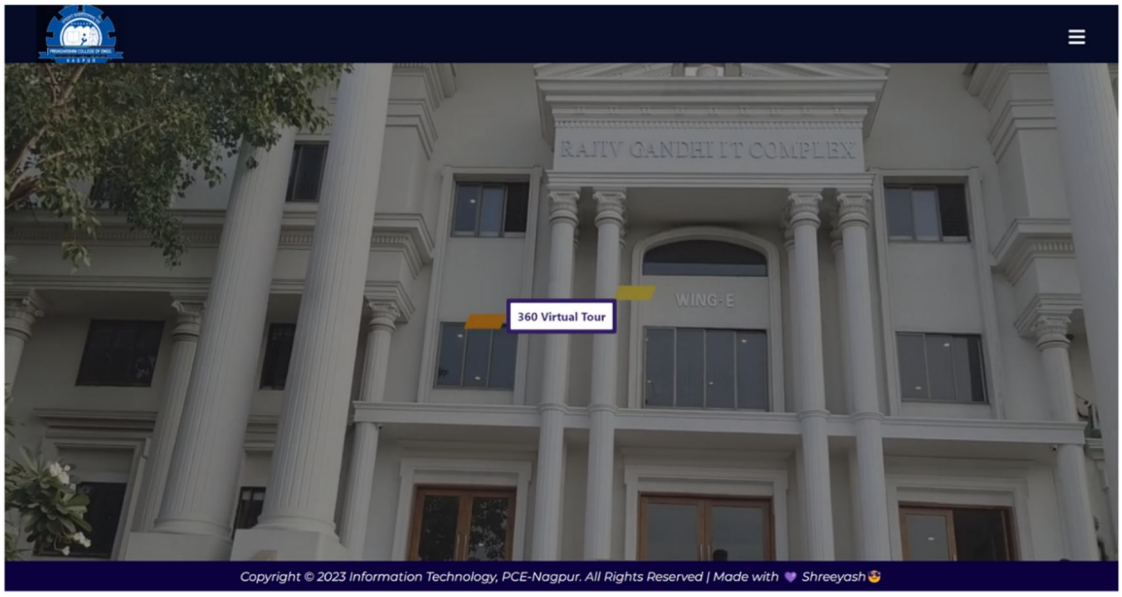
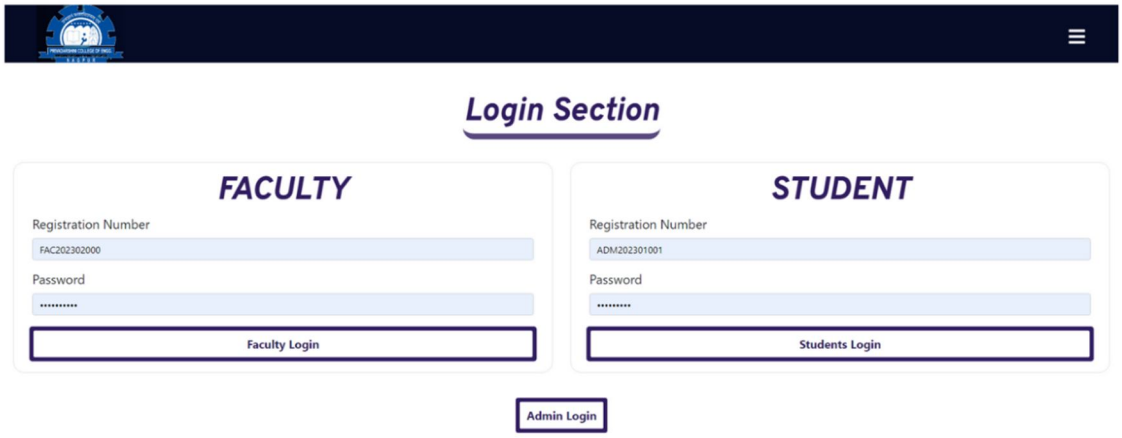


Virtual Tour



Login Page

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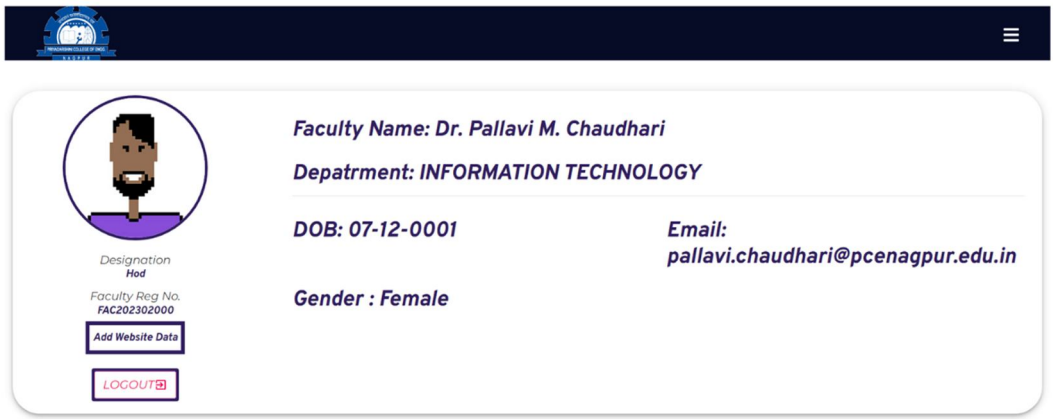

Admin Dashboard



Students Dashboard

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IX. DEPLOYMENT

In order to deploy our project we used two backend servers Our project's main backend server is hosted on a cloud server known as Render, which is a popular hosting provider that offers open source and free offerings to its user Using Render services we were able to efficiently host and manage our project backend infrastructure, ensuring it remained very secure, stable, and easily accessible for our team and any potential users.

As for the frontend portion of our project, we decided to host it on our college intranet. This decision was made primarily to enhance security measures by limiting access to the front end to only authorized personnel within our department. By doing so, we were able to ensure that sensitive information and user data were adequately protected, while still providing a seamless and intuitive user experience for those who needed to interact with our project's front end.

1) *XAMPP:* With the help of XAMPP, programmers can create a customized web server environment on their desktop or laptop that can be used for testing and debugging web applications without the aid of the internet or a distant server. An acronym for Cross-platform (X), Apache (A), MySQL (M), PHP (P), and Perl is XAMPP. (P).
2) *Intranet:* An intranet is a private computer network used by an organization to share information and resources among its members or employees. It works like the internet, but it is only accessible within the organization.

X. CONCLUSION

In conclusion, a department web portal with various components designed for a college intranet system can provide multiple benefits to enhance communication, collaboration, and resource-sharing among students, faculty, and administrators. In addition to the admin, faculty, and student components, the web portal can have additional features like project management, event management, notes management, academic management, and faculty management components, virtual Tour, placement showcase, By implementing such a comprehensive department web portal on the college intranet system, the college can streamline its internal operations, improve learning outcomes for students, facilitate collaboration among faculty members, and simplify administrative tasks for the department.

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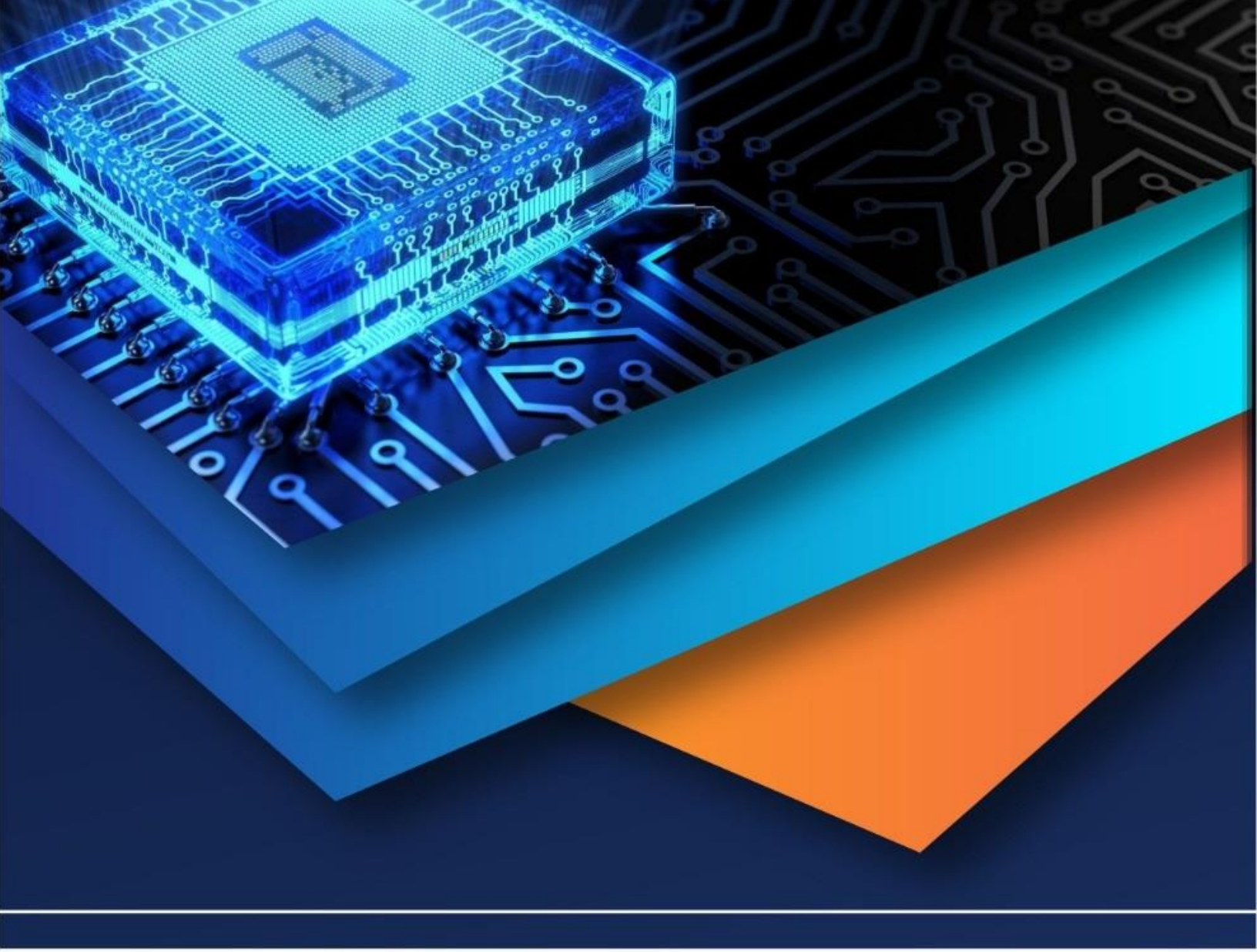

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