PLACEMENT MODULE

SUBMITTED IN PARTIAL FULFILLMENT FOR THE REQUIREMENT OF THE AWARD OF DEGREE OF

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE

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Session 2024-25

DEPARTMENT OF COMPUTER SCIENCE

KIET GROUP OF INSTITUTIONS, GHAZIABAD

(Affiliated to Dr. A. P. J. Abdul Kalam Technical University, Lucknow, U.P., India)

2024-2025

DECLARATION

We hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

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This is to certify that Project Report entitled **Placement Module** which is submitted by **Akash Pandey, Aditya Narayan Yadav, Praveen Kumar Yadav, Ujjwal Soni** in partial fulfillment of the requirement for the award of degree B.Tech. in Department of Computer Science of Dr. A.P.J. Abdul Kalam Technical University, Lucknow is a record of the candidates own work carried out by them under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

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ACKNOWLEDGEMENT

It gives us a great sense of pleasure to present the report of the B. Tech Project undertaken during B. Tech. Final Year. We owe special debt of gratitude to Professor **Dr. Anurag Mishra** Department of Computer Science, KIET, Ghaziabad, for his/her constant support and guidance throughout the course of our work. His sincerity, thoroughness and perseverance have been a constant source of inspiration for us. It is only his cognizant efforts that our endeavors have seen light of the day.

We also seize an opportunity to thank **Dr. Ajay Kumar Shrivastava**, Head of the Department of Computer Science, KIET, Ghaziabad for his full support and help in the development of the project. We also do not like to let the opportunity go when we are able to express our gratitude to all the faculty members of the department for their kind assistance and cooperation during the development of our project.

Fourth and final, we put in place our friends who had a part to play in the completion of the project.

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ABSTRACT

Placement Module is a wholesome web-based application which will make campus recruitment easier and smoother and provide smooth interaction between the recruiters, placement coordinators and even students. The essence of the project is of course how to increase efficiency of such placement activities as posting a job, students' application, scheduling of interviews, and monitoring results. It works with modern Web technologies like HTML, CSS, JavaScript, Bootstrap, and Tailwind CSS to front-end and Node.js, Express.js, SQL and REST APIs to back-end. The system provides all users onboard with a seamless user experience as well as an interactive interface.

The important functionality of the module is user log in via security, real time reminders and notifications, a centralized database to manage the students records and jobs postings, and end to end tracking of status of the application. These features enable the reduction of manual handling of administrative work, space the communication gap, and maintain transparency during the recruitment cycle. The module enables placement coordinators to easily manage high volumes of data and also students to not lose sight of opportunities and status. The record for the candidates that they would be interviewing is able to be accessed in an effective – efficient manner by recruiters. All in all, the Placement Module offers increased coordination, utilizes time saved and successfully completes the recruitment better, hence it offers a better and well-organized experience to educational institutions and hiring firms.

SDG MAPPING WITH JUSTIFICATION

SDG 4: Quality Education

Platform Role:

The placement system enhances quality of education because it provides tools that are career oriented. It is the latest questioning, competency-based preparation material and inspiration of what previous candidates had experienced. These resources create the foundation for lifelong learning/career readiness/continuous skill development thrusting students into employment easily.

SDG 8: Decent Work and Economic Growth

Platform Role:

The system minimizes youth unemployment through the provision of a well-structured access point for connecting students to an extensive range of job opportunities. It provides efficient and fair matching of jobs ensuring a smoother transition from academic to working life. This helps fuel economic growth through the creation of a skilled labour force and promoting a fair distribution of decent work.

SDG 10: Reduced Inequalities

Platform Role:

The platform ensures that students who come from different backgrounds, castes or belong to different socio-economic strata, have equal opportunity to access placement resources, have equal opportunities to utilize training tools & have equal opportunities to secure a job. It ensures that all the demonstrates receive equal treatment and receive the same support level towards facilitating easy reduction of differences between the learning population, consequently, an inclusive and equitable placement environment.

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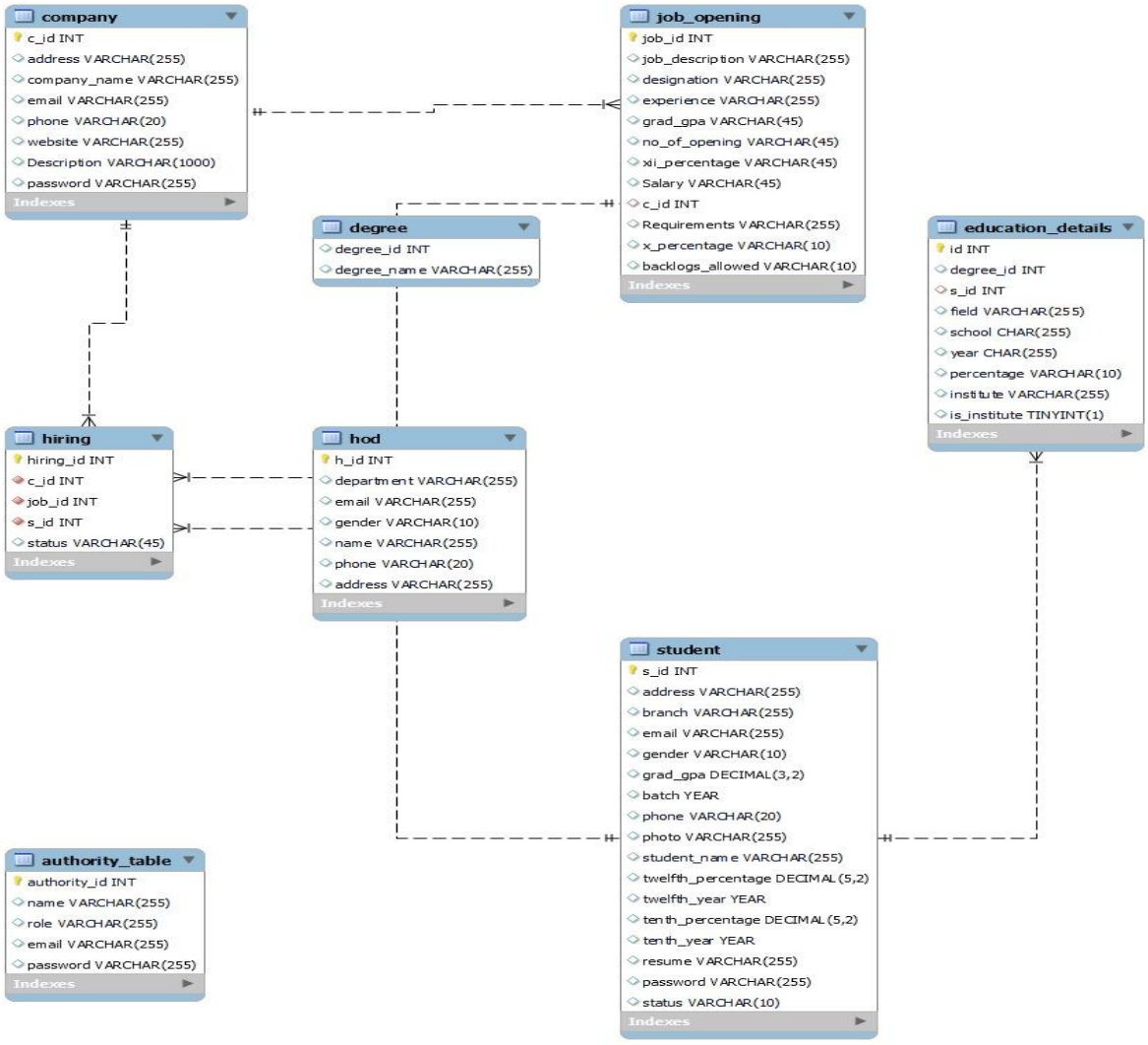

Figure 1.1

1. Overview

The dataset schema helps control and manage the flow of data for different aspects of campus recruitment. By using it, students can connect with companies, HODs, and other administrative professionals, and share job openings.

2. Purpose

It shows the connections among students, job openings, hiring information, education, and companies. It allows for easy and fast searching of data and makes it possible to process a larger volume of data.

3. Key Entities and Relationships (part of the Placement Module in the ERD)

- **Student**: It holds information about students, including their names, branch, scores, and resumes.
- **Company:** It holds information about students, including their names, branch, scores, and resumes.
- **Job_Opening:** Includes postings made by companies about jobs, listing the designation, who can apply, and skills required.
- **Education_Details**: Helps in recording students' records such as their school, percentage, and year.
- **Degree**: Shows the available degrees and connects students to the job requirements.
- **Hiring**: Identify which company hires which student for a given job.
- **HOD:** Details for the stores department heads allow for effective control.
- **Authority_Table**: Stores access information for managing the system.

4. Relationships:

- Education records can be created for one student several times.
- A business is able to create more than one job posting.
- Hiring for a single job may involve numerous students (since there is a hiring table).
- The hiring table links students, jobs, and businesses together.
- These tables allow for reducing the permissions granted to users and for checking their authority.

Activity Diagram

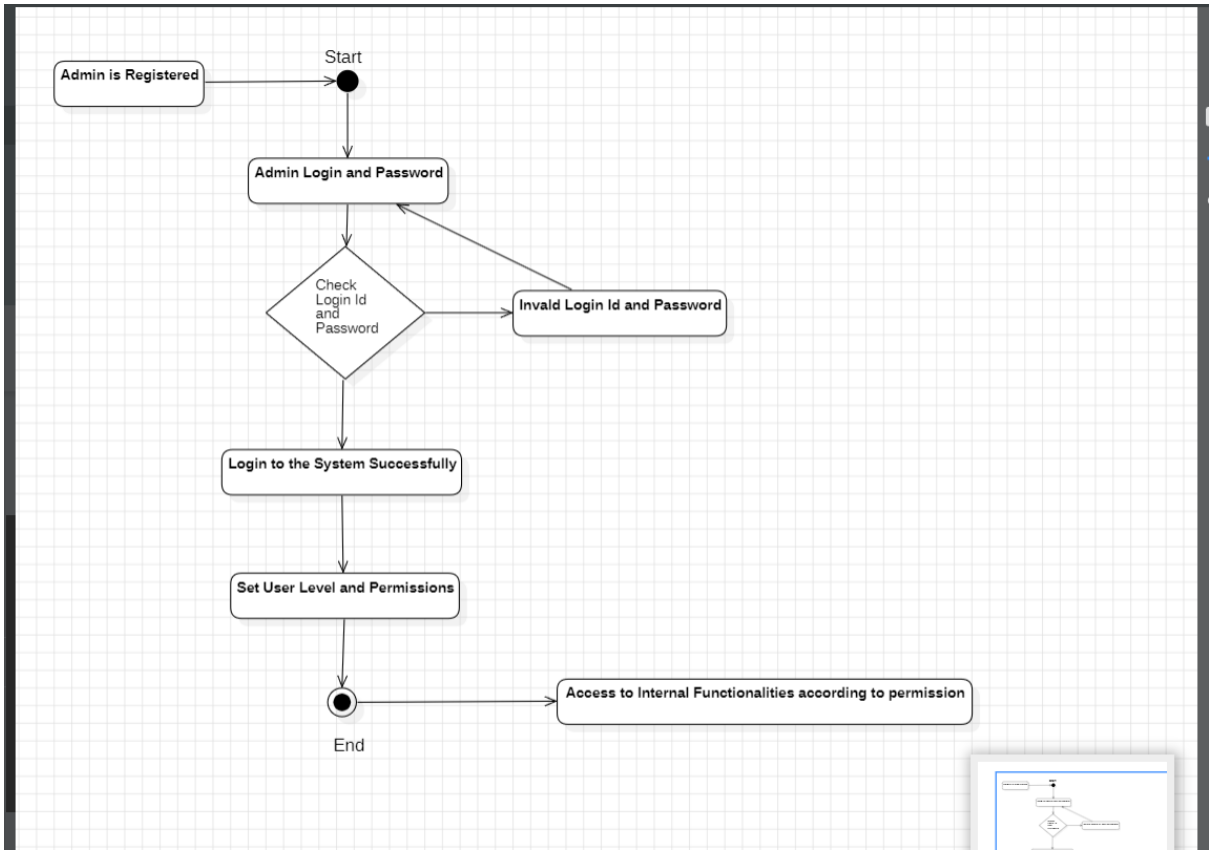

Figure 1.2

Explanation for Report:

This shows how Studios use the Admin Login Process feature in the Placement Module. It explains how an admin goes about logging into the system.

Steps Explained:

1. Start – It starts when the admin presses the login button.
2. Admin Login and Password – After logging in with their ID and password, the admin moves on to the next page.
3. The computer requires the user to provide a Login ID and Password which it verifies.
4. Valid credentials are needed for access to be granted and otherwise, an error message appears.
5. When the credentials are correct, the admin is able to log in.
6. Afterward, the system establishes the user's role and permissions according to the admin's role.
7. The admin's access to internal functions depends on the roles they are permitted to handle.

CHAPTER 1

INTRODUCTION

1.1 Overview

In light of the present digital age, technology has become a necessary element in making traditional systems more efficient and transparent. Campus placement process is also an area in schools that needs to be modernized. Traditionally, the process of placing in colleges has been predominantly based on manual record-keeping, which includes engaging Excel sheets as well as hard copies. This not only causes inefficiencies, error, redundancy of data, but it also puts more work in the placements coordinators pockets and limits access for recruiters and students. In an attempt to address these issues, the project recommends the setting up of an online Placement Module which will be a centralized automated system to ease and streamline the entire recruitment exercise in educational institutions.

The placement module is a web based full stack application which can be used for three different user's groups and their requirements. students, recruiters, and placement officers. It is a comprehensive site where firms will be able to advertise job openings, the students will be able to apply on the eligibility aspect, the placement officers will be in a position to control the schedules, and monitor the progress as well as prepare reports. The system makes the communication between all the concerned smooth, and it ensures equal and transparent recruitment.

1.2 Need for the System

Campus placements are crucial for careers of students and reputation of an institution. However, its manual handling presents many difficulties:

- There are a lot of data duplications and redundancies occurring because of the scattered Excel sheets used.
- Eligibility checking would involve manual work for combating per student for the company's criteria.

- Scheduling interviews and updating results are time-consuming, but this information can often become miscommunicated.
- Students do not have access to current information on job openings and applications submitted.
- People at the placement officials must still prepare and create reports and dashboards for institutional analysis.

All of them lead to the issue of the abuse of the system of campus placements and its lack of effectiveness and application to a large scale. Especially in large institutions. Consequently, there is an urgent need for a centralized as well as digitalized one that decreases manual work and product maximum accuracy speed and accessibility.

1.3 Objectives of the Project

The primary purpose of the Placement Module project is to automate, and improve the current campus placement processes using a web-based platform. Specific goals include:

- Automating placement process from announcements of jobs to final selections.
- The availability of a live database with available job openings, eligibility requirements, and job application status to students.
- To make it easier for the recruiter, publish job roles effortlessly, filter out the candidates and schedule for interviews.
- Giving placement coordinators authority to harness the process and oversee it effectively.
- Keeping a central database for students' records, job postings or requisitions, and selection results.
- The reduction of administrative load, the elimination of redundancy and human errors in the data.
- Increasing transparency and communication among stakeholders that are part of the placement process

1.4 Scope of the Project

Principal concern of the project is the internal placement management system which can be found in a given educational institution. The scope includes:

- **Student Module**: Application, profile managing, resume upload, search of jobs, application tracking.
- **Recruiter Module:** Registration of Company, Posting of jobs, Shortlisting of eligible students, Scheduling of interviews.
- **Admin/Coordinator Module:** Data verification, eligibility match, event scheduling; analytics and reporting.
- **Notifications**: Real time mails / dashboard for job openings, interviews and results.
- **Data Management**: Secure and organized storage of student academic record, resumes, and placement results.

The system employs the **full stack architecture** through a responsive frontend, efficient backend and secure relational database. It is scalable as far as its use by institutions is concerned to fit the ball parks of all institutions regardless of their size and can be expanded to incorporate other attributes such as analysis of resumes, AI-based candidate match, integration support of outside job portals.

1.5 Methodology

Engine Development of the Placement Module (explained in phased terms):

- **Requirement Analysis**: Needs analysis of students, recruiters, and placement coordinator via interviews and feedback.
- **System Design:** Wireframing, database schema, and system architecture design for efficient module integration.
- **Implementation:** Frontend and backend with the help of HTML, CSS, JavaScript, Node.js, Express.js and SQL.
- **Testing:** Doing the unit testing, user acceptance testing, and security testing in order to have a robust experience without bugs.
- **Deployment**: Hosting the system on an on premises or cloud base server for access and real time use.

All the modules evolved from test to introduction through iterative development with continuous loop of feedback incorporated to make functionality and viewers' interface experience better.

1.6 Benefits of the Placement Module

And there are quite a few advantages from the implementation of this project such as:

- **Reduced Administrative Burden:** Eligibility checks, scheduling and data handling automation.
- **Real-Time Access:** Students and recruiters receive notifications in time.
- **Improved Transparency:** All placement activities are documented and made available for the purpose of eliminating confusions and biases.
- **Better Student Preparation:** Combination of previous interview questions, remarks from recruiters, and resource on skill-based topics.
- **Institutional Insights:** Dashboards and analytics enable the institution to track performance and make a prudent decision.
- **Fair and Equal Opportunities:** Information and job roles are not differentiated because all students have access to them equally which leads up to inclusive growth.

1.7 Project Description

The Placement Module is an online form that should make the campus placement process smooth and automatic. It was designed with some new emerging web technologies to create a successful and easy to utilize platform; one that has the ability to induce students, placement coordinators, and even recruiters.

Front end of the application uses HTML, CSS, JavaScript, bootstrap and tailwind CSS. Through these technologies the interface is responsive, clean & user friendly in computers and in the mobile device. The frontend enables users to navigate into the platform easily, view jobs available and apply for a job. and track their application status.

Backend is through Node.js and Express.js which aid in management of server-side jobs and user's request. For a database major everything is saved i.e. students profile, jobs, application and interview schedule, in a SQL database. Through use of REST APIs, safe and sleek interaction between backend and frontend is achieved and there is possibility for data transfer from users to the system in real time.

The platform distinguishes three major types of users:

1. **Students** can register themselves, give profiles, upload their resumes, find jobs, apply for jobs and receive updates at real time with reference to their status and schedules for interviews.
2. **Placement Coordinators** can log in and post new job openings, student applications and set up eligibility criteria and be able to schedule interviews as well. They also have the ability of reporting and tracking the placement progress for students.
3. **Recruiters/Companies** can submit online and upload their vacancies into the platform, filter and view student submissions, shortlist candidates and upload results directly through the system.

The platform has the Placement module that includes secure authentication functionalities in order to only enable logged in users to access their respective dashboards. This creates data security and user anonymity. The platform offers recruiters and students real-time updates by notifications regarding essential events like, new vacancies or rescheduling the interview etc.

A centralized student database would allow coordinators to easily conduct online searches and filters based on a number of criteria including department, CGPA, Skills or resume key inputs. Automatic tracking keeps every application in a record, thereby making it easier to monitor the recruitment process from start to finish.

The Placement Module in minimizing man-hour work and maximizes the efficiency as a whole. It replaces the use of Excel sheets and manual verification of eligibility and makes the whole process smooth and transparent.

In conclusion, the Placement Module transforms the conventional placement system into a digital form. It helps schools to manage placements professionally, scalable, and accurately and ensures that companies and students enjoy a better experience. The project demonstrates that technology can improve the important academic process and help students achieve career success.

CHAPTER 2

LITERARY REVIEW

More and more, academic institutions depend on Placement Management Systems, as these tools make finding a job for students quicker and more convenient. Several projects and studies have aimed to define, design and assess both the functions and outcomes of e-learning systems.

Punitha Nicholine J and others created a Placement Management System to streamline campus recruitment by automating functions such as student registration, handling companies and trace placement details. They wanted to ensure that the use of their system was easy, that it required less time spent doing tasks manually and that communication between everyone was better. The study concluded that having such a system in place greatly improved how well and transparently placement drives were managed ([1]).

Just like Datee, Ajeena Sunny et al. (2020) introduced a web platform, mainly for helping with campus recruitment needs. With the system, users could manage students, build resumes for them, announce jobs and schedule interviews. The researchers concluded that adoption of digital tools made students and work-placement coordinators more efficient and time-conscious ([2]). Ensuring ease of use and ability to handle more users helped the solution suit the needs of several institutions.

Adarsha S.P. et al. (2022) agreed, suggesting a method that also resulted in automated shortlisting and notifications received in real time by the students. Modules were included by them for checking if people are eligible, uploading paperwork and analyzing placement. Studies reveal that automating the eligibility check process cut down on recruitment mistakes and made it quicker for applicants to learn the outcome ([3]). It suggested that adjustment to ongoing recruitment policies and student outcomes is important.

Additionally, studies have analyzed how placement systems and internships contribute to an individual's ability to find a job. The researchers conducted the field experiment in 2021 to see the impact of internships on students' likelihood of finding work after leaving school. It was found that undertaking internships that relate to their studies helped students secure jobs. The findings indicated that making internships available through a system such as a PMS could be an important policy approach for boosting youth employment ([4]).

In addition, Alfiya Banu and Dr. Manju Bargavi S. K. (2022) explored existing Placement Management Systems and how they help students prepare for their future and benefit the institutions. They came up with a method that applied AI and data analytics to predict what jobs people would likely enter and gave personal guidance for their careers. They discovered that effective PMS tools can help students by fitting

their skills to what is needed in the industry. Because of predictive analytics, placement cells began to work ahead and support recruiters while planning training activities for students.

According to the literature, Placement Management Systems make a positive difference in the way campus recruitment happens. Every study discusses that businesses need automation, live communication and decisions based on data. But only a limited number of systems paid attention to features that play a role in guiding and evaluating student careers and abilities.

Basically, what started as a means to keep records has grown into robust systems that help handle all stages of recruitment. According to what was reviewed, an implementation is successful thanks to features like being user-friendly, scalable, integrated with the main databases and in line with requirements of the industry. To better connect education and employment, upcoming research and development ought to improve personalization, prediction skills and ensure all platforms are connected.

CHAPTER 3

PROPOSED SYSTEM

The Placement Management System proposed here will serve to integrate and manage the various tasks related to placement process of a particular organization starting from the placement officer, HOD, faculty coordinators to students. It enables students to feed their information and is taken and sorted academically through different user menus with operational privileges for the principles, HODs placement officers, coordinators and students both. Using MongoDB for database storage, the system will screen students based on the company criteria for recruitment and will send an email notification, which will inform interested candidates about the openings for the drives, where they can upload their interest.

To further enhance the system's functionality, the following three implementations will be added:

3.1 Probability of Selection of Student in a Particular Company: A Concept as to Its Implementation

The Placement Prediction Feature is an innovative feature built into the Placement Module using historical recruitment information, student performance indicators, and company-specific requirements to predict the possibility of a student being given an offer by a given company. By looking into past placement patterns and correlating individual student profiles with profiles of successful candidates in the past, this feature brings data-driven decision-making into campus recruitment.

Historically, students have used guesswork or friends' recommendations to identify which firms they should be applying to. This tends to produce wasteful results—students will apply to jobs for which they are too underqualified, or, conversely, will not apply for positions for which they are appropriately qualified because they lack confidence or awareness. In the same vein, recruiters also spend a significant amount of time sorting through massive amounts of applications to shortlist qualified candidates by hand. The Placement Prediction system solves both problems by giving a probability score for each student with respect to each company.

The core of this system is a prediction algorithm trained on historical placement records. This data includes information such as:

- CGPA and academic performance across semesters
- Branch of study and course difficulty
- Participation in relevant certifications or online training programs

- Technical and soft skills listed in student profiles
- Internship experience and project work
- Participation in co-curricular and leadership activities
- Job roles offered in past placement seasons and their required skill sets

Comparing the profile of a student with those of successful ones from past years, the algorithm ascertains a probability score or matching percentage of a job opportunity. This score is the statistical measure of the potential for that student to be hired by a specific company based on previous-trends.

This element is highly beneficial for students because it provides them with individual placement information. Rather than sending their resumes randomly to various firms, students can direct their efforts in places where they are most likely to succeed. They can even look at weaknesses in their profiles—like securing a certification, internship, or certain skill—and take proactive action to address these points before the subsequent placement round. This fosters career planning in a strategic manner and lessens missed opportunities due to ignorance.

For placement officers, the software accommodates certain student training and enhanced recruiter-to-candidate compatibility. In case of a low match rate for a given group of students for a specific top recruiter, the placement team can arrange targeted workshops, mock interviews, or skill-improvement sessions to fill the gap. It also enables proactive advising and guidance to those students who may be having difficulty with baseline expectations.

This capability, from the point of view of the recruiter, can be a pre-screening aid. Recruiters can refer to prediction scores provided by the system whenever batch of candidates turn up, and narrow down based on the statistical resume of their previous hiring process. It is simpler, more efficient, and more contextual, that is, higher conversion rates, higher satisfaction for both the employer and the candidate.

Technically, one can do this with machine learning models such as logistic regression, or decision trees neural networks trained on labeled placement data. It may also cover real time updates for better precision in prediction as new data becomes available during the drive for continuous placement.

Besides, the feature promotes ethical issues by ensuring transparency and enables the presence of feedback loops. The students understand the reasons behind their prediction scores and the options for a better performance as opposed to being subjectively imposed with.

In a nutshell, the Placement Prediction Feature brings some intelligence and personalization into placement process. It benefits all stakeholders, students, placement coordinators and recruiters alike, by introducing transparency, efficiency and strategic thinking of career choice making. It finally closes the chasm between opportunity and potential, improving the campus placement process to be stronger, data oriented, and future proof.

3.2 Use of the Resource Sharing Feature for Students during Recruitment

This function is designed to enhance the success among the students in the process of getting hired through enhancing collaboration and sharing of precious assets. Through creation of a platform where students can share their experiences, advice, and documents, the function hopes to establish a collaborative and sharing environment. The intent is to enable students to excel in interviews, tests, and other hiring-related exercises, and finally land jobs in an intense job market.

One of the important aspects of the feature is students' ability to share documents that pertain to their interview experience. Such papers include resumes, cover letters and other written applications students; have used while looking for jobs. By uploading such documents, students can give others some idea of how they've personally gone about securing jobs and examples of things that worked best for them. This transfer of documents will help students know what employers expect from applications and how to create an organization of their own materials to be recognized.

Apart from sharing application documents, the feature will enable students to share experience at interviews. This could be, for example, description of the type of questions that were asked during interview, the makeup of the interview, and other clues or hints that facilitated them be successful. Interviews can be nerve wracking especially for new students that have just started to apply for work. By learning of others' experiences, the students can better learn what to do, how to prepare, and how to answer a variety of interview questions. This sharing of knowledge in the platform will create a community and feeling of support amongst students to team up and support each other's success. Another helpful feature that the platform will offer is going to be the exchange of company specific advice and tips. Every company has its own corporate culture, expectations, and values, and if you become familiar with them it can make quite a difference when you apply for jobs! Students may share any insider tips or tricks used when signing up at certain companies. For example, they will be in a position to share details about company's interviewing process, type of controls or tests used, and kind of person the company looks for in applicants. To other students, such type of information can help them adjust their applications and be better prepared for interviews or tests with that company.

In this regard the site will also provide suggestions as to the best way to prepare for varying recruitment-based exercises. These exercises may take on the form of case studies, aptitude exams, technical queries or group discussions. By offering advices on how to answer these exercises, the platform will help students gain the skills and belief needed to succeed. Such may include time management, problem solving tools, idea expression. Also, the platform might include sample exercises/practice questions that students could write answers to in order to test their knowledge, and those answers can be reviewed as possible suggestions by the leader.

Probably one of the most powerful aspects of this platform is the opportunity to support collaboration and peer support. Through involvement in the discussions, students are able to ask questions share advice and get in return what others who have gone through similar experiences gone through providing feedback.

This creates a co-operative learning environment in which students do not only learn from other people but also one to share with them own experience and expertise. For example, students who have managed to overcome a hard interview or test may be helpful to those who are about to take a similar challenge. In exchange, students who have not summited the career ladder can request for help, ventilate their fears and gain confidence towards future recruitment exercise they will engage in.

The school site may also have a discussion forum or a database where students can search for a specific topic, document(s), and tips in a snap. This would allow students to get relevant information at will regardless of whether they are searching for general or company specific tips. Simplifying the content in an easily accessed format, the site is sure that ideals of the student to use the resource provided, is met.

Finally, this feature aims to create a ground where the students can get in touch, learn from and support each other when it comes to recruitment process. With the help of experiences, documents and advices, the site will empower students to acquire the knowledge and skills necessary for succeeding in the interviews, tests and other recruitment operations. With their fellow students' support and decent materials to advance on, students will be more inclined to have a confident attitude about their approaching job search process and enhance their chances of landing the right jobs.

3.3 Placement of Recruitment Stage Tracking in Placement Module

Recruitment Stage Tracking Module is one of the key features which enhance the functioning of the Placement Management System and it is a systematic and transparent mode in which the recruitment process is handled and tracked. The module is meant to serve administrators and students alike by improving efficiency and organization of the recruitment process. With the use of live updates and the provision of full insight into processes for each candidate in various recruitment stages, the module helps reduce the uncertainty among students and ease of workflow of placement officers and recruiters.

As one of the primary purposes of the Recruitment Stage Tracking Module, there will be presented a clear step-by-step understanding of the recruitment process. The recruitment stages will be broken down within the module into major milestones such as application submission, test completion, interview cycles and final selection decision. The steps will all be graphically presented on the platform, and therefore it's going to be easier for students as well as placement officers to track the progress of every candidate in real time. This transparency is especially helpful to students because they know where they stand in the recruiting process, and what they need to do to reach the final decision.

For placement officers, the Recruitment Stage Tracking Module is a valuable tool which they can use to keep track of multiple recruitment processes at one go. In most cases, placement officers work with

numerous students who want to get into different positions backed by several companies at once, meaning the workload can quickly accumulate within hours. Without an organized system to guide each candidate through, especially in a period of multiple recruitment processes, it is difficult to track all movements. This module alleviates the problem by providing a point of unification where such placement officers can track the status of each student without looking for repeated follow-ups or manual tracking. Within a few clicks they can see a candidature status at any point of recruitment process starting from application submission to final shortlisting.

The other significant benefit of this module is that it can eliminate uncertainty for students. One of the most stressful parts of the hiring process is a lack of communication and feedback on a candidate's status. Students frequently feel confused about where they are in the process, and this can cause anxiety and unwarranted follow-up emails to placement officers or recruiters. Once the recruitment tracking system is implemented, students are provided with instant information regarding the status of their applications, test scores, and interview phases. This can decrease nervousness to a great extent and provide students with a clear idea of what they have to do next. Additionally, by lessening the requirement of frequent status questions, students will be able to concentrate on working towards the subsequent phase of the process, instead of asking themselves about their application's status.

The recruitment stages will be organized systematically within the module, with each step being clearly defined and easy to track. For example, the stages could include:

- **Application Submission:** This is the level at which students apply for a given job. The module will have a track of when the applications are received and avoid missing or losing applications in the process.
- **Test Completion:** Most companies look for candidates who have taken a number of assessments including aptitude tests or technical exams. The module will monitor when these tests are done and the result will be recorded in a real-time. Placement officers will easily be able to access this information and in so doing easily tell if a candidate has advanced to the next stage.
- **Interview Rounds:** Interviews are conducted several times over for candidates depending on the company and they include initial screenings, technical interviews and final HR interviews. The module will monitor the completion of every round of interview giving placement officers an overall view of the progress of a given candidate.

- **Final Selection:** This is the last decision made at the company's level on the selection of the candidate. The module will give clear information to the placement officers that the candidate has not only been selected or rejected, but feedback received from the company as well.

The module, through regular updates and easy access to information at every stage assists in keeping the students and the placement officers well informed and organized. This feature will also be useful to recruiters and employers and will enable them to handle candidate pipelines more effectively and make better decisions quicker.

Further, the module will be incorporated into the general Placement Management System, such that there will be seamless connection between students, placement officers and employers. This integration guarantees that every pertinent data in automatically synchronized and accessible on the platform. For example, once a student has moved up in stages for instance after completing a test or interview, the information is updated in real time so that everyone is on the same page.

Finally, the Recruitment Stage Tracking Module makes an extremely high contribution to the Placement Management System as it accelerates the recruitment process, makes it more transparent, and better organized. By giving real time updates and tracking, it saves not only the uncertainty and anxiety of students but also saves the workflow of placement officers and employers. This all-inclusive tracking system allows all users including students, institutions and employers access to the tools and information necessary to succeed in the recruitment process. Finally, this module will be a key improvement that will make the Placement Management System better for all the parties involved, in the recruitment and placement process.

CHAPTER 4

REQUIREMENT ANALYSIS AND SYSTEM SPECIFICATION

4.1 Feasibility Study

A feasibility study is an important aspect in the process of checking the chances of the success of a project through a technical, financial and operational feasibility exam. The Placement Module is not an exception to this as it incorporates both a composition of technological, financial and operational elements that will determine its effectiveness and sustainability in facilitating the recruitment procedures for students, placement officers and employers. This section provides the detailed analysis of the Placement Module's feasibility from three important aspects of perception: technical, economic, and operational.

4.1.1 Technical Feasibility

Technical feasibility of the placement module deals with the possibility of building, deploying and maintaining the system using current web technologies. The project is based on commonly used stable web technologies: HTML, CSS, JS, Bootstrap, Tailwind CSS – for the frontend and Node.js, Express.js, SQL, and REST APIs – for the backend. These technologies are standards of the industry, but they also offer great scalability and maintainability to ensure that the Placement Module scales along with the ones' needs.

Frameworks like HTML, CSS, and JavaScript constitute scaffolding for a design of the user interface that is user-friendly and responsive meaning that the tools are essential to the user experience of the website. Bootstrap and Tailwind CSS take it a step further in building up the frontend as the developers can code mobile-friendliness, responsive webpages that can read from devices. This guarantees the usability of the system even for a user who uses a desktop, tablet; or a smartphone.

In the backend, Node.js and Express js provide a powerful and efficient one stop place for server-side logic, that would enable the system to be capable of processing data requests and database interaction and deliver content to flows smoothly. SQL, as the database management system, provides for an orderly storage of the database consistently and retrievable with ease for candidate status, recruitment stages and user profiles as well. The use of REST APIs enhances easy communication between front and back-end in real time updating and synchronizing data.

By all these technologies, there is high support of the developer community, and this ensures that there is a vast ocean of resources, tutorials and best practices that can be utilized to debug and develop further. The system can also be further extended easily in that; with placement process changing or new features being added to the system, it can be adjusted to support new requirements without the heavy overhauling. Overall, the technical feasibility of the Placement Module is high because it exploits modern web application technologies that are scalable maintenance-friendly and future compatible integration needs.

4.1.2 Economic Feasibility

Financial viability in the form of the development and running cost is the criterion of economic feasibility for Placement module. Open-source technologies are one of the most positive aspects of this system. It cost little to purchase, free to use open-source software such as Node.js, Express.js, and SQL therefore the initial costs associated with purchasing software can be very minimal. This saving on licensing allows the more economical development process particularly for academic institutions or entities that may be developing within the more constrained fiscal terms.

Also, the placement module can also be deployed onto the institutional or cloud servers thus minimizing infrastructure costs. Cloud hosting providers such as AWS, Google Cloud, or Microsoft Azure have scalable and adjustable pricing plans, so the system can expand along with demand without paying large amounts of initial hardware costs. Institutions or organizations can only pay for the resources that they consume, lessening the total expense and offering a cost-effective solution to server infrastructure.

For long-term savings, the automation functions of the Placement Module, for example, auto-updates of recruitment progress and tracking of candidates, can reduce the workload of placement officers dramatically. By minimizing manual tasks like data entry, follow-ups, and status enquiries, the system can save quite a lot of time, where staff can divert their attention towards more strategic tasks. This easing of administrative workload means long-term savings in human resources costs as well as improving operational efficiency.

In addition, the Placement Module would also offer useful insights into placement patterns, which can be used to guide future recruitment and resource planning. Through real-time information on candidate

progress and employer demand, the system enables institutions to make informed decisions, maximizing their investment in recruitment activities.

4.1.3 Operational Feasibility

Operational viability determines how to practically apply Placement module and whether it will operate or have a place to occupy in the actual world, for example, its simplicity in the adoption by the different stakeholders involved (placement coordinators, students and recruiters). User experience has been taken into account in developing this system, such that the interface to this system is easy to navigate, intuitive, and user friendly for both skillful and unskillful technical users.

For placement officers, the system removes much of the mundane work of administrating tracking of movement of a candidate between the recruitment phases to scheduling of interviews to follow up to the recruiters. This ensures minimum error opportunities while it ensures placement officers execute various recruitment drives simultaneously getting no slowed down. Automated reminders, real-time updates and integrated dashboards deputize it easy for placement officers to have a beehive over the recruitment activities without having to make frequent follow ups and status reports.

Students are favored by the system's simplicity and ease of use, with an interface where they can track their application progress, receive live updates on interviews, as well as LLCI, CMMI, and Agile Frameworks preparation resources. Every step of the recruitment process's visual clarity wipes out uncertainty, thus allowing students to stay engaged and tasked with preparing themselves for the next step. The system is loved by students for being simple and easy to use, and they have an interface to monitor the progress of their application, to receive live updates in case of interviews and LLC I, CMMI, and development using Agile Frameworks preparation resources. At each step of the recruitment process's visual clarity removes any uncertainty thus student remain engaged while tasked with preparing themselves for the next step.

In a nutshell, the Placement Module has a strong operational viability because it offers an intuitive interface, effective automation, and seamless integration with the workflow of all stakeholders (placement officers, students and recruiters). The ease of use and usability of the system are at the heart of the system's design so that it can easily be adopted without too much training or process disruption.

4.2 Software Requirement Specification

The SRS gives the system requirements for proper implementation of the Placement Module. This component is responsible for delivering the data, functional, performance, maintainability, and security requirements, all of which must be ensured so as to ensure that the system will actually serve the needs of the students, placement coordinators and recruiters. In these specifications, the Placement Module will be in a position to function well, securely and efficiently in such a way that the use of all stakeholders will be smooth.

4.2.1 Data Requirement

To be effective the following data will be required by the Placement Module:

Student Information:

- Personal Details: Name, roll number, qualification, and contact information must contain for identification of student and matching with vacancies of jobs.
- Resume: Student resumes will be stored in a standard format by the system so that recruiters and placement officers can review and shortlist applications with ease based on qualifications, experience, and skills.
- Application Data: The system will monitor which jobs have been applied for, the status of each application, and what extra documents or forms are demanded by the recruitment process.

Company Information:

- Company Details: Industry, name, and contact information.
- Job Positions: Details on the positions being offered, job descriptions, required skills, and job location.
- Eligibility Criteria: Requirements on the qualifications, experience, and skills demanded for each position.
- Recruitment Process: Details on the stages of recruitment, any tests, interviews, or assessment rounds that are conducted, and any particular deadlines for each round.

Application Data:

- The application process should be supported by the system, including student information, job preferences, and monitoring of the progress of the application. This includes automatic monitoring of application stages (submission, test, interview, and selection).

Interview Schedules and Outcomes

- The system will retain information regarding interview timetables, including date, time, venue (or virtual meeting link), and interviewer information. Interview results (pass/fail, feedback, etc.) will also be monitored and reported to students so that they can prepare for the next phase.

4.2.2 Functional Requirement

In the Placement Module the following ought to be present:

User Authentication:

- Student, Coordinator, and Recruiter Authentication: In order for all the users including students, placement coordinators and recruiters to access the relevant services they need to user secure logins and role-based authentication.
- Students will be able to monitor their applications and job postings; recruiters will be able to advertise jobs and manage applicants and placement coordinators will have permission to manage.

Job Posting and Application Submission:

- Posting of Jobs: The recruiters should be capable of posting job vacancy by submitting details of the post, eligibility condition and selection procedure.
- Job Applications: The students can apply for any available jobs by posting the resumes on upload and filling any forms required. The system will verify the applications from the eligibility conditions.

Resume Management and Candidate Filtering:

- The system should also allow placement coordinators and recruiters to filter and manage student resumes depending on: qualification, skill, experience or other aspects in order to simplify the process of choosing candidates.

Interview Scheduling and Alert System:

- The system will automatically time schedule interviews depending on the recruiter's preference and the availability of the students. It will also inform students and recruiters of upcoming interview dates, schedule alterations or results of interviews.

Live Status Updates:

- The students ought to receive up-to-the-minute feedback about the status of their application, like if they have been shortlisted for an interview, receiving feedback for the interviews, or getting selected/rejected.

4.2.3 Performance Requirement

The system's performance should meet the following requirements:

Multi-user Handling

- Multiple users should be able to access the system simultaneously without any delays. This includes job-seeking students, recruiters who conduct interviews or examine resumes, and placement coordinators who handle applications. The system should be able to support hundreds or thousands of users at once without a noticeable lag in response.

Rapid Data Retrieval and Updates

- The system should meet the following, the system should provide quick response to fetching data, updating records, and update the real-time status. The time required to be taken to load pages or fetch application status should be less than a few seconds to provide user a seamless experience.

Effective Database Queries

- Database queries must be improved in terms of speed especially in broad search and filtering. For example, when students look for job advertisements or recruiters filter through resumes, queries need to run quickly with results coming almost in real time

4.2.4 Maintainability Requirement

The system needs to be maintained and updated with ease:

Modular Code Organization:

- The code should be split into clean block of modular elements for easy of debugging, troubleshooting and feature update. Every module such as job listing system or scheduling interview feature has to be independent of one another so as to make them easy to update without disrupting the whole system.

Periodic Database Backups:

- The database should be backed up regularly just in case the server fails or something else happens. During backup plans there should be full backups at periodic intervals and incremental backups of change made during the course of a day to prevent loss of maximum data.

Scalable Architecture:

- As the number of users and job listings grows the system must scale unsuspended. Whether running on servers or those of the cloud infrastructure, the architecture of the system needs to accommodate addition of storage, memory and processing capability, without significant disruption or redesigning.

4.2.5 Security Requirement

The issue of security is also important for Placement Module as it will be working with sensitive data such as student data, job vacancies and employer data. The system should, for instance live up to security best practices:

Secure Login with Encrypted Passwords:

- User's credentials (username and password) should be safe from anyone and hijack of the user's accounts should be avoided to the extent of the to the extent that their accounts will not suffer from inflations if access by unauthorized persons.

Role-Based Access Control:

- RBAC has to be used by the system to control access to feature based on a role of the user. Students will be able to access job postings and the application follow up, while recruiters and coordinators will have another set of privileges such as duty to filter resumes, interview plans, job postings.

How to protect against SQL Injection and XSS Attacks:

- Methods of input validation must be applied to prevent SQL injection, cross site scripting (XSS) and other evil attacks. For example, clean user input in job applications, cv, and forms would remove the possibility of code injection.

Data Encryption for Sensitive Information

- Sensitive information such as student contact information, resumes and application status has to be kept encrypted both on the way – with HTTPS, and at rest in the database. This ensures users data security and privacy.

4.3 SDLC Model Used

Agile Model was selected in this project because it has an iterative development model through which ongoing improvement was achieved according to stakeholder input. Important advantages are:

- **Incremental Development –** It is developed in phases, where it is possible to test early on and make necessary improvements.
- **User Collaboration –** The system was fine-tuned regularly with input from placement coordinators and students.
- **Flexibility** – It facilitated modifications according to changing requirements without breaking the development cycle.

This model assured the Placement Module was built effectively, with regular updating and upgrading.

4.4 System Design

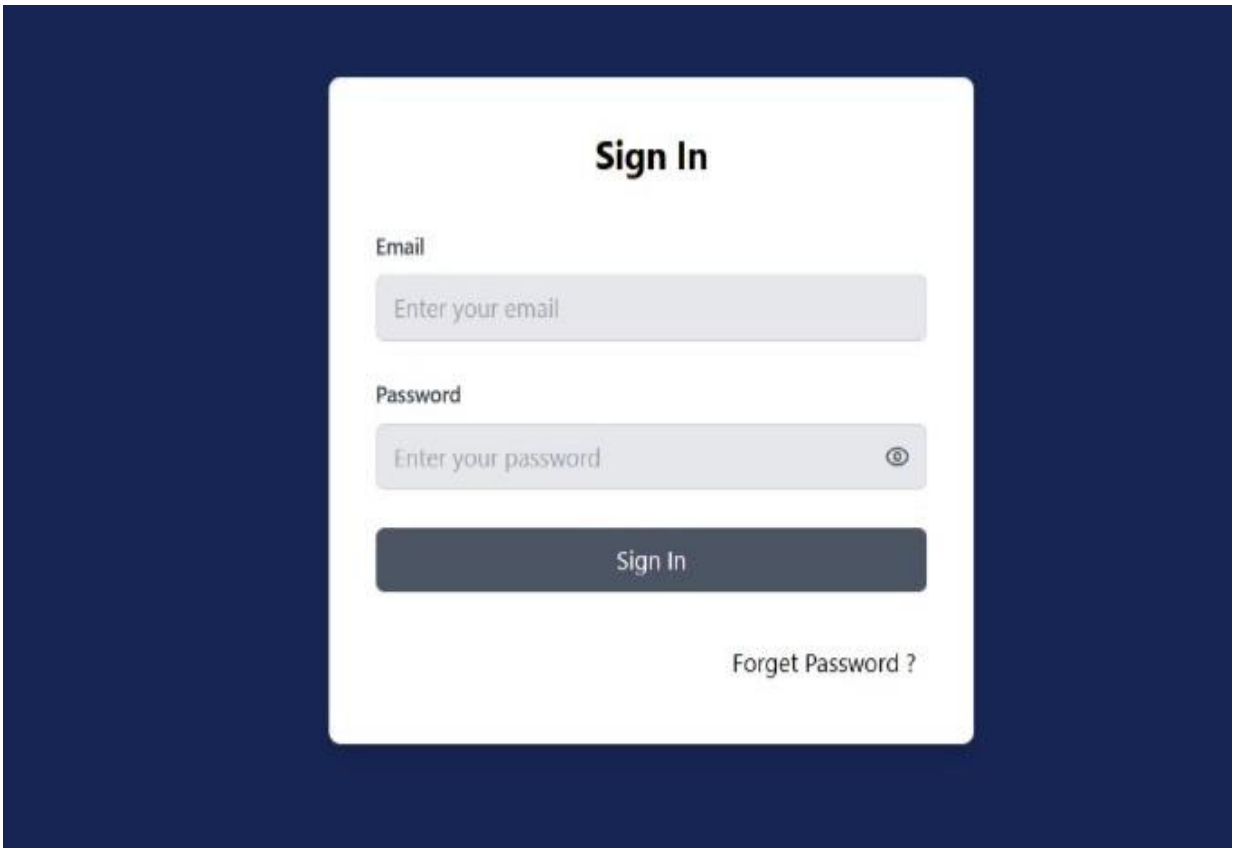

Figure 4.1

The sign-in part of the Placement Portal is shown here. Users have to enter their email and password to use the login form. The app is easy to use because the input fields come with hint text to guide you. Users in the password field can use an eye icon to check or hide their typed password. Below the log in button is a way for users to recover their account if they have forgotten their password. Because of this screen, only those who are supposed to use the platform can access its features.

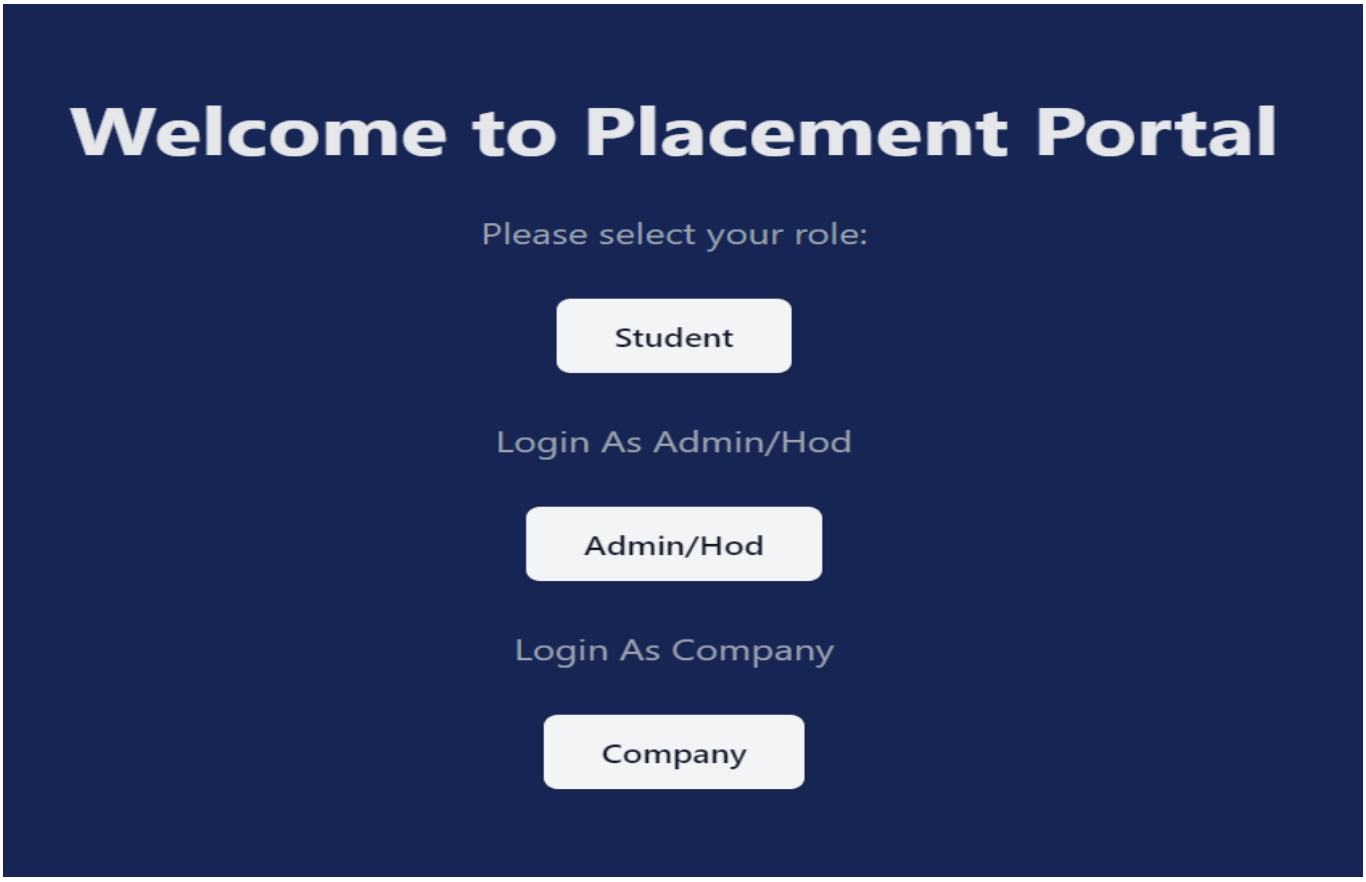

Figure 4.2

This is the main page of the Placement Portal which directs users to where they should log in depending on their function. **Students, Admin/HOD and Company** members are greeted with a clean and simple interface and can log in using three separate options. The placement team provides services that allow students to seek jobs and follow the status of their applications. Student administration, openings for jobs and handling placements are handled by admins and HODs. Companies have the option to post jobs on the website, check student profiles and oversee the hiring process. With role-based access, all people involved in placement have a safe, neatly organized and user-friendly experience.

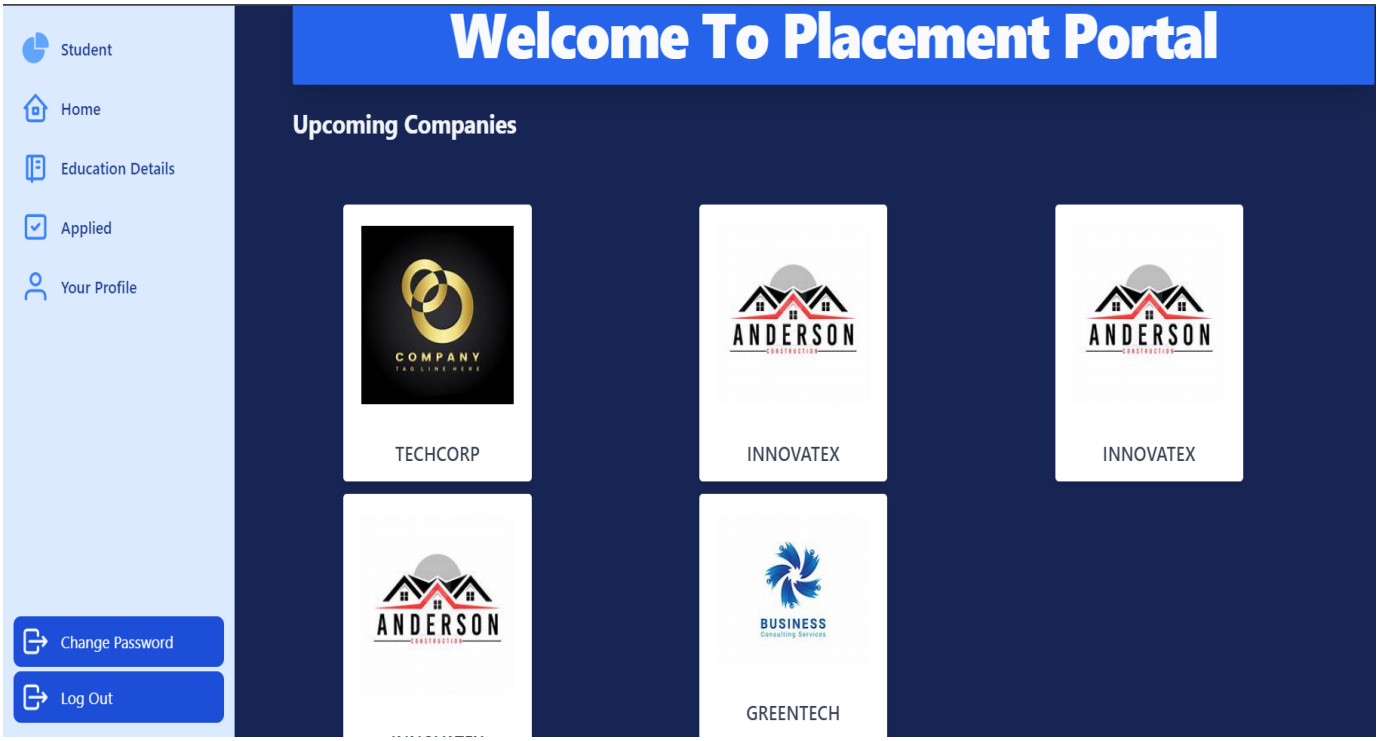

Figure 4.3

This picture shows what the Student Dashboard of the Placement Portal looks like. The interface is clear and helps students easily access information on any upcoming business drives. Students can easily find recruiters on the dashboard since each company's name and logo are displayed. All important areas such as Home, Education Details, Applied Jobs and Profile, can be easily accessed through the sidebar menu. You can also use the menu to change your password or log out from the account. Thanks to the centralized system, students can view job openings and oversee their applications in one place. It improves the way users interact with websites.

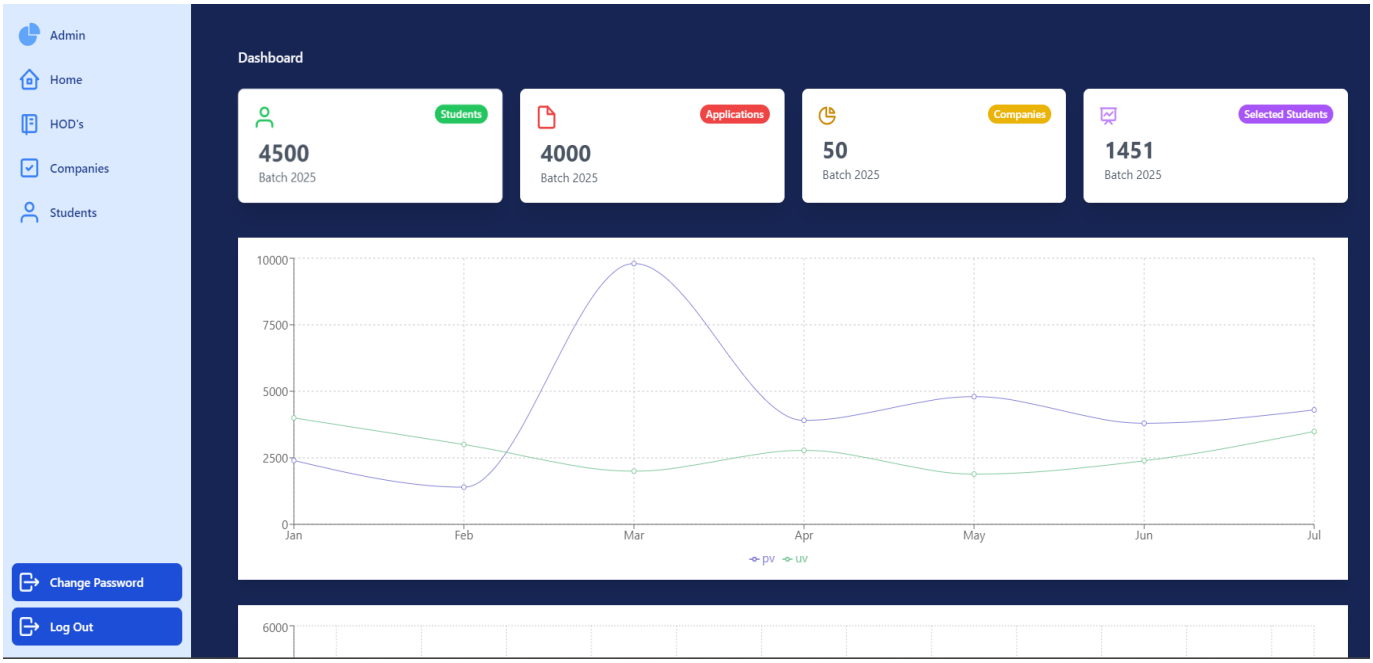

Figure 4.4

You can see here the Admin Analytics Dashboard on the Placement Portal. So, for the group expected in 2025, the overview provides the following statistics: total number of students (4500), total number of applications (4000), number of companies (50) and number of students chosen (1451). Using visuals, you can see when application activity or selections changed or peaked on the website. Modules Home, HODs, Companies and Students can be accessed from the menu in the left sidebar. With the dashboard, administrators can follow the campus recruitment process and check the effectiveness of their actions in real time.

It is beneficial to have the Admin Analytics Dashboard because it displays the whole process in a simple and easy-to-follow way. Managers use it to monitor numbers like the number of students, applications, companies involved and students admitted in just one location. Charts allow users to see trends, the times with the most applications and how the site has performed over several months. Thanks to data, decisions about hiring and how to allocate resources can be made quickly and accurately. It also allows analysts to spend less time collecting data from various sources. In brief, a dashboard improves how well, how understandable and how organized placement management functions.

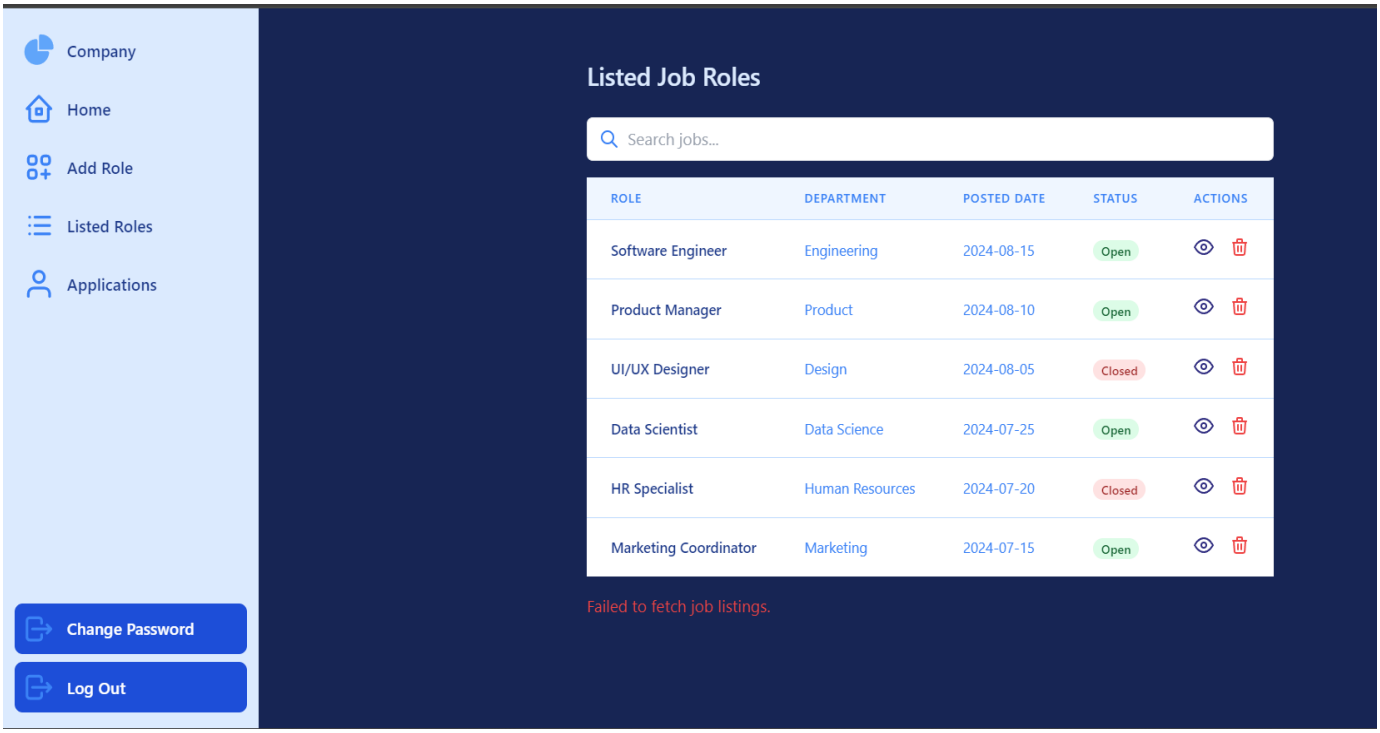

Figure 4.5

The Listed Job Roles interface is where companies can manage and keep an eye on their job ads. All jobs are easily identified by their titles, departments, dates they were posted and whether they are open or closed for applications. You can use the search bar on top to make it simpler to manage specific roles. The use of colors lets you visually tell if a role is active or not. Tracking which roles, a user has is easy and any updates or deletions can be done using the action buttons. It ensures more transparency and organization when you have to deal with several recruitment positions.

With this feature, job management becomes smoother for recruiters. As the company's hiring needs change, roles can be adjusted on their website so that only open jobs are advertised for applicants. Roles are sorted with status indicators in the interface, making it easier to notice if an application for them is unnecessary. It simplifies communication between the company and the placement system and reduces the time needed to carry out searches. Overall, it supports a more efficient, clearer and quicker process for recruitment, making it more satisfying for everyone.

4.4.1 Data Flow Diagrams

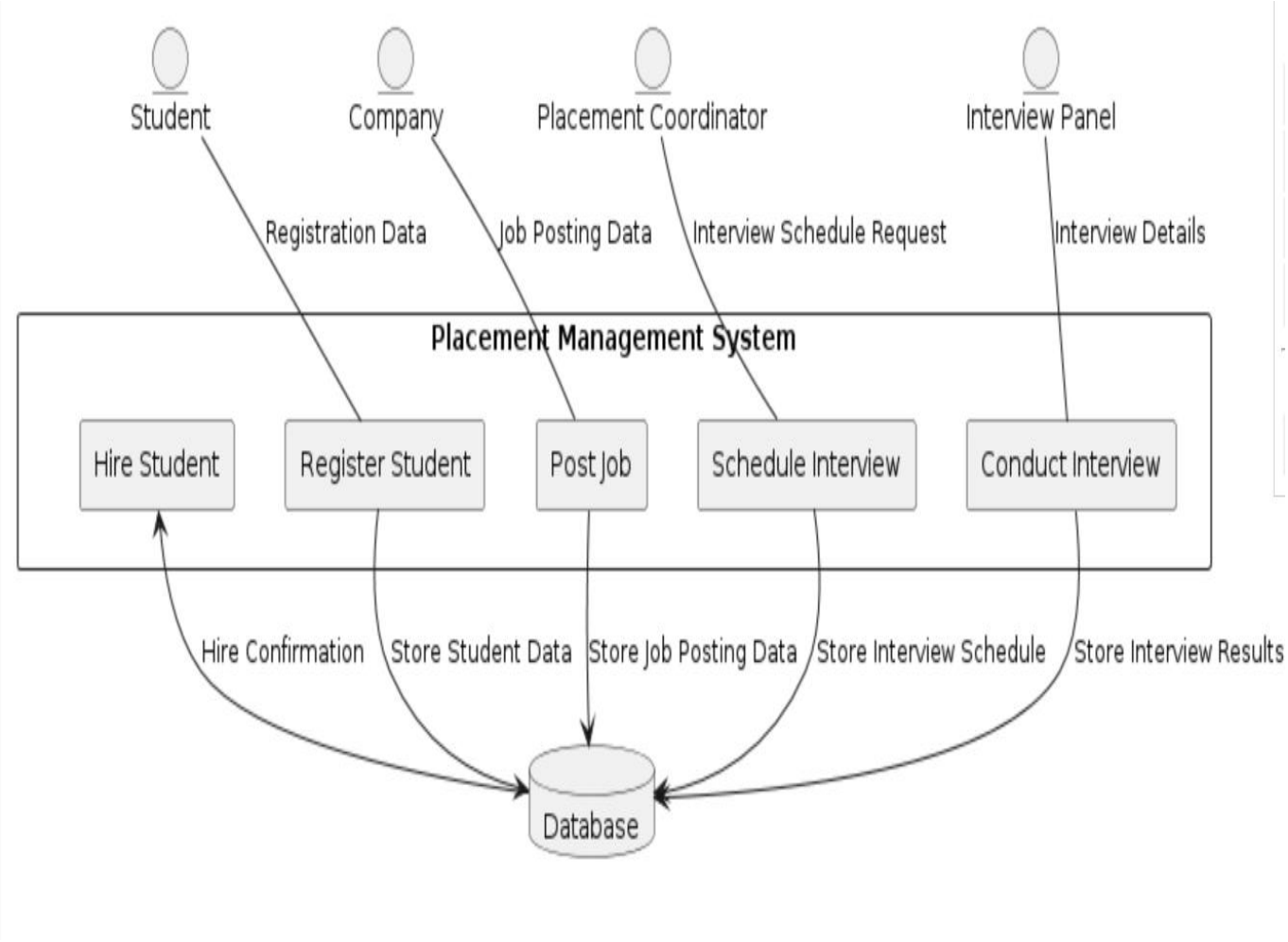

Figure 4.4.1

This diagram illustrates **Placement Management System** in relation to its interactions with the major stakeholders: **Students, employers, placement officers and interview groups**. Each stakeholder brings a unique data set such as **Registrations**, **Job Posting**, or **Interview Scheduling** while interacting with system elements **Register Student**, **Post Job**, **Schedule Interview**, and **Conduct Interview**. This is in relation to the central database for student, job, and interview data but also offers such outputs as interviews schedules and accounts of employment. After following this structured flow, the system promotes smooth work, correct data management, and optimized campus placement services.

4.4.2 Use Case Diagrams

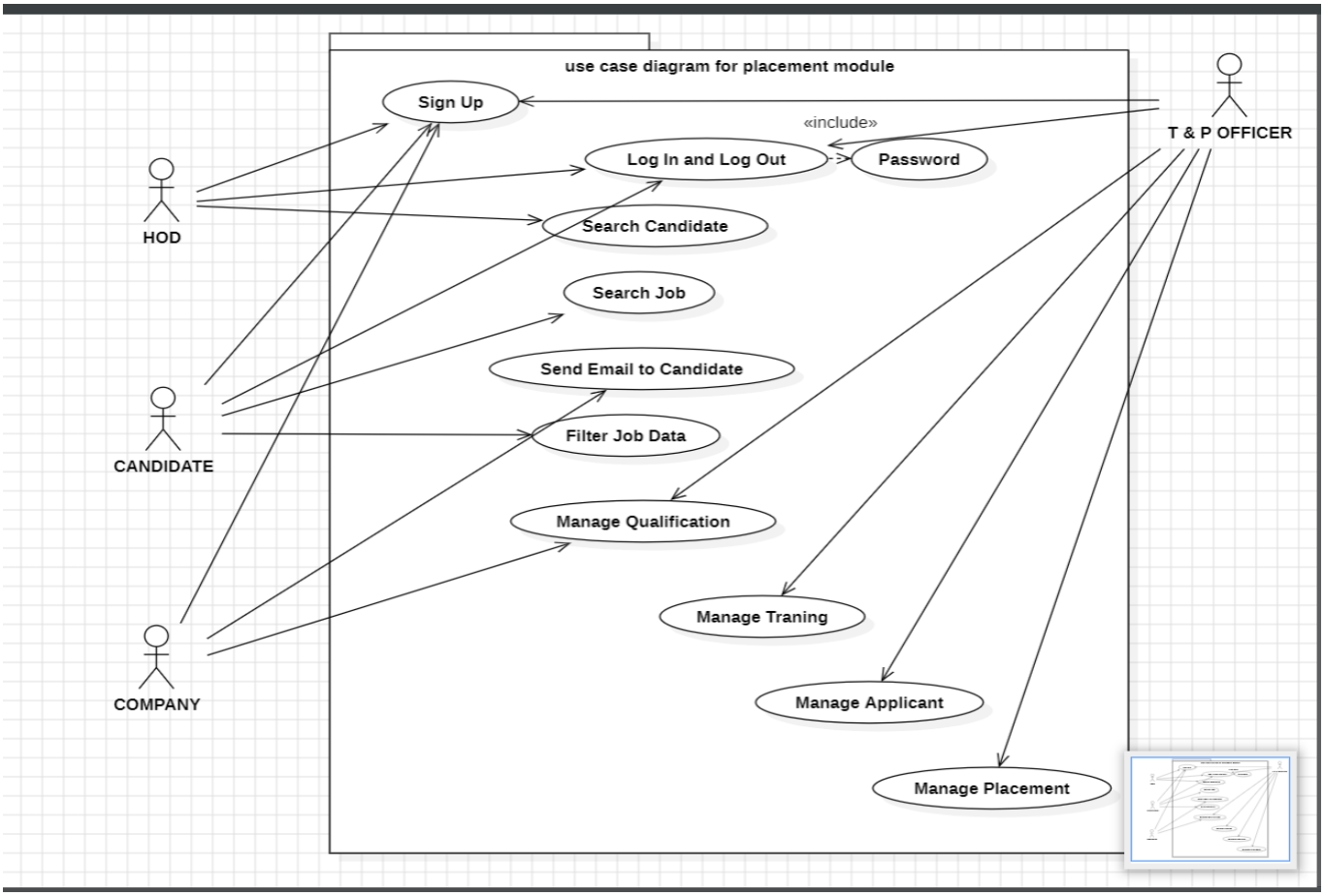

Figure 4.4.2

The placement module in the use case diagram displays the relationships and activities within the system with the help of legitimate users such as HOD, Candidate, Company, and T&PS officer. The system facilitates sign-ups for new users, password protected logins, job searches and candidate browsing, email communication, and supervision of qualifications, training, applicants and placement information. Candidates use the system to find jobs and manage their qualifications, but companies use it for finding candidates and sending messages. T\&P Officer has maximum access, and is responsible for all the management functions. Through outlining user roles and system capabilities, the diagram facilitates organization of a structured placement process.

CHAPTER 5

IMPLEMENTATION

5.1 Introduction

The process of implementation involves converting the planned system into an operational Placement Module. It involves setting up the development environment, coding, system component linking, and functional testing. The Placement Module was coded following a structured process to enable smooth deployment and efficient functioning.

5.2 Technology Stack Used

- Frontend: HTML, CSS, JavaScript, Bootstrap, Tailwind CSS
- Backend: Node.js, Express.js
- Database: SQL (MySQL/PostgreSQL)
- APIs: REST APIs for data communication
- Authentication: JWT-based secure login system

5.3 Implementation Steps

5.3.1 Setting Up the Environment

- Required software: Node.js, Express.js, SQL database and frontend libraries; are installed.
- Set up an instance of the version-control system (GitHub) for better handling of code eternalization and collaboration.

5.3.2 Database Design & Setup

- Domain specific relational database table patterns have been formulated for user centric entities like Users, Jobs, Applications and Notifications.
- Established and imposed relationships between entities in order to guarantee the integrity and consistency of data.

5.3.3 Backend Development

- Invented RESTful APIs to support a few of the functionalities; Job listings, application and scheduling interviews.
- The attempted move to unite the authentication and the permission system in an attempt to secure the access control.

5.3.4 Frontend Development

- Created an intuitive and responsive user interface in Bootstrap, HTML, CSS and JavaScript.
- Combined the contents of the frontend with the backend APIs to develop dynamic contents rendering.

5.3.5 Testing & Debugging

- Test each module for unit and integration test for the functional reliability.
- Problems were fixed and the performance and user experience matched easily.

5.4 Deployment

- Link a local institutional server or cloud-based server and you are able to access it through the linked placement module.
- The operational stability maintenance purpose was considered on the basis of the regular database back and system monitoring measures.

The successful roll out of the Placement module has simplified and computerized building of a robust user-friendly platform for students' recruiters and placement co-ordinators.

CHAPTER 6
TESTING AND MAINTENANCE

1. Improved Efficiency

With the automation of most of the former manned hiring procedures, the Placement Module increases efficiency significantly and reduces time and effort for students and placement coordinators.

- **Job posting automation:** The recruiters simply enter and upload the openings with ease without manually posting the ads as the system does this automatically. It makes work easier for the coordinators, places the job posts in the hands of the students promptly, and expedites the hiring process.
- **Simplified Application Process:** Students apply via the system, eliminating paper forms and manual reminders. Students apply for multiple opportunities in one click, and the system holds all of their applications organized. This reduces administrative time, allowing students to focus on interview preparation and other recruitment phases.
- **Automated Interview Booking:** The process books the interviews automatically according to both the available time and calendar of the recruiter and student. Live reminders along with calendar integration make the scheduling easier and cut down on chances of no-shows or duplication of bookings. Coordination is easier with eased management of parallel drive recruitments and less need for human workforce, thereby resulting in overall improvement in operational efficiency.
- **Real-Time Updates:** Applicants and recruiters are kept up to date regarding real-time updates in the hiring process, such as the latest status of an application, schedule updates to a schedule, and shortlisting for an interview, through automatic alerts. Thus, there is less follow-up, minimizing human errors and streamlining the recruitment process as a whole.
- **Less Error and Redundancy:** Human errors committed through manual processes, such as incorrect applications or lost documents, are the usual case. Because all of this information is fed through automatic workflow, human error is removed by the Placement Module. Secondly, eliminating redundancy eliminates repetition, for instance, repeated inputting of the same information.

2. **Improved User Experience**

Being user experience driven, the Placement Module is designed in such a manner that all stakeholders—recruiters, students, and placement coordinators—are able to navigate the system with ease and get their work done efficiently.

- **Responsive Design**: Through technologies like HTML, CSS, JavaScript, and Bootstrap, the system is designed on responsive web design so that it will be absolutely fine on desktops, tablets, and smartphones. Its flexibility makes the platform very accessible and increases the level of user engagement because it allows users to use it wherever it's most convenient for them to do so, either at home, in class, or at internship locations.
- **Intuitive Interface:** Customers can easily switch between sections such as job postings, application status, interview schedules, and messages owing to the user interfaces (UI) easy-to-use design. Owing to the system lowering the learning curve, even non-technical customers like students can easily adapt to the system and enjoy all the advantages.
- **Real-Time Messaging and Communication:** Officers, recruiters, and even students are all capable of communicating in real time through offering the platform of real-time messaging. This feature offers an efficient open and collaborative recruitment process for issuing feedback after interviewing, discussing the purpose of the application status, or simply explaining the information regarding vacancies available. Decision-making is facilitated through this solution by encouraging real-time student-recruiter interaction.
- **Personalized Dashboards:** Based on their role, recruiters, coordinators, and students can all be provided with a personalized dashboard reflecting relevant information. Placement coordinators can monitor the whole hiring process, recruiters can monitor job postings and candidate resumes all on one screen, and students can easily keep track of their application and interview schedules. This customization allows users to read information that interests them without needless navigation.
- **Easy-to-Use Notifications:** Important notifications like interview invitations, test results, or job openings that match a candidate's qualifications, are communicated through the system across various channels (email, system messages, etc.). By reminding users never to miss an important event, these messages improve user satisfaction and overall performance.

3. Better Data Management

Effective data management lies at the heart of the Placement Module, making the system scalable, dependable, and secure. It allows both students and recruiters to access important information instantly and accurately, whenever they need it.

- **Centralized Database:** The system uses a centralized SQL database to store everything—from student profiles and resumes to job postings and application statuses. This setup not only makes data easy to manage but also ensures that everyone is working with the most recent and accurate information. For placement coordinators, this means they can monitor live recruitment activity without delays.
- **Well-Structured Information Storage:** Data related to students, recruiters, and applications is organized in a way that allows quick filtering and searching. For example, recruiters can easily look for candidates with specific skills or qualifications. Thanks to this structure, even large datasets remain easy to navigate and use.
- **Instant Data Updates with REST APIs:** The system is built to sync data between the frontend and backend in real time using REST APIs. So, whenever a student applies for a position or a recruiter updates an interview schedule, the changes show up immediately for everyone involved.
- **Reliable Data Validation:** The module includes smart checks that catch incomplete or incorrect entries before they're saved. For instance, students are prompted to complete all necessary fields before submitting an application. This keeps the system clean and reduces the chance of errors.
- **Regular Backups and Recovery Measures:** To guard against data loss, the system performs routine backups. If something unexpected happens, data like student records or job statuses can be quickly restored. This backup strategy adds a strong layer of protection and ensures that nothing important gets lost.

4. Greater Transparency

Transparent recruitment process creates trust and makes it possible to give all candidates an equal opportunity. The Placement Module was designed with this in mind and explains the entire procedure for an easy follow through of recruiters and students.

- **Monitoring Applications in Real Time:** Students can keep an eye on the status of their applications any time – submission, shortlisting or rejection. Not only does this remove the jurisdictions of confusion, but also frequent follow up with placement staff or recruiters.
- **Immediate Feedback from Recruiters:** Following interviews, recruiters can give feedback to students that they can view in the platform. Even if they don't get the job, students benefit by learning, where they did well and where they need to improve in.
- **Status Updates in Real-Time:** Whenever the recruiters reschedule their interviews or update their candidate status, the system automatically communicates the same to students. This keeps all informed and eliminates unnecessary delays.
- **Secure, Role-Based Access:** In order to secure confidential data, the system makes grants secure login options. The Access is provided in the form of a user's role – therefore, only those that are supposed (students, recruiters, personnel officers, etc.)
- **Precise Activity Logs:** Everything that happens in the system, including, posting jobs or scheduling interviews is tracked. These logs allow coordinators and administrators to keep track of whatever is happening and to correct whatever may occur if it does.

The testing phase of the project was to ensure that the entirety of the frontend and reliability as well as quality in Flutter was achieved. To ensure that the application performed as desired and that the goals were met, it was critical to have a tested plan that fit the needs of the project. The team used: Software – Selenium IDE for auto testing, Mantis BT to report a failure, and bug tracking to maximize the testing, identify and fix the bugs.

1. Requirement-Based Testing

Ensuring that the application conformed to the project's foregone objectives was the primary objective of requirement-based testing. These specifications included a spectrum of performance, usability, and functionality that were essential to achieving project success. In order to ensure that all tests aligned with the goals of the project each of the tests was stipulated in precise, concise terms prior to the testing process. To test the system to ascertain that that the system was working as expected and meeting the requirements provided by the stakeholders, the testing team used these requirements to create some test cases.

A variety of benefits were provided by requirement-based testing methodology. It eliminated the risk of overlooking vital functional components by ensuring every aspect of the program was practicing by the established requirements. This approach also contributed to the detection of possible inconsistencies between the initial concept and the outcome variants. The team ensured the system ran according to user expectations and legal or regulatory constraints or business by measuring each achieved feature against the needs.

2. Functional Testing

Functional testing was one of the important stages of the testing process and it made sure there were basic features and functionality of Flutter-based frontend. The aim of the testing of such type was to verify that the input forms, navigation and data visualization features worked well and effectively. The functionalities of the app were tested independently in order to verify that each of them was working as desired without glitches.

Functional testing also provided some assurance that the logic of the system was strong because it demonstrated that the program reacted in a predictable way when provided with data from a user and that usable data generated the responsive output. In order to make each feature real and user-friendly, and achieve the intended effects, the team modelled real-world use. The team was able to use this kind of test to help locate discrepancies between expected and actual behaviour, so that problems could be corrected before deployment.

3. Integration Testing

So, to make the Flutter frontend able to communicate the backend services, APIs, and other system modules properly, the integration testing became a requirement. This kind of testing was formulated to make it certain that each of the system modules functioned in synchronization with the others just as they must, without disagreements or data circulation problems. With integration testing, the intent was to look for any issue that was arising when more than one module or service was talking to each other.

API call verification to ensure data was passing from the frontend to the backend correctly was a critical part of integration testing. The team ensured that each backend response was well rendered on the frontend to ensure the freshness and integrity of data displayed in the user interface. This phase was crucial in establishing mismatched data, communication breaks, and integration points that could negatively impact the app's overall performance.

4. Usability Testing

The primary goal of usability testing was to evaluate the UI of the application in relation to responsiveness, accessibility, and simplicity. Built with Flutter, the application was intended to be cross-platform, so maintaining a steady performance across devices was a top concern.

The testing team concentrated on verifying that the app was intuitive, accessible to users with diverse abilities, and easy to navigate. The evaluation covered multiple aspects of the interface, including design layout, clarity of labels and instructions, and overall user experience across different screen sizes and operating systems.

In order to maintain consistency, the app was tried on iOS and Android devices. Adaptive UI behavior has received a lot of attention and the response to interface elements was right, offering a uniform experience regardless of platform. Reduced visibility features such as voice commands and screen reader compatibility were also evaluated carefully to ensure usability for all possible users.

5. Performance Testing

Performance testing was designed to evaluate the stability and responsiveness of the application under various situations, especially when the application is exposed to various user loads and volumes of traffic. Keeping the program running smoothly even in situations of high usage was the main objective of performance testing. This kind of test identified memory leaks, performance bottlenecks, and even response-time delays.

The aim of performance testing was developed to validate how responsive and stable the app remains under varying scenarios, that is, when subject to unstable amounts of traffic levels and user load. The aim of performance testing was to establish that the program could perform perfectly even with overwhelming usage scenarios. This type of testing was conducted to ascertain potential response time lag, performance bottle necks, and memory issues.

Bug Report: -

Using Mantis BT, create a bug report.

Bug Report Table for Placement Module

Bug ID	Summary	Description	Severity	Priority	Status	Steps to Reproduce	Assigned To
001	**Incorrect Student ID Validation**	Student ID field allows special characters and exceeds character limits.	Major	High	Open	1. Navigate to "Student Registration". 2. Enter `@#123456789123456`. 3. Submit. 4. Observe incorrect acceptance.	Developer A
002	**Placement Preferences Not Loading**	Placement preference dropdown fails to load department list on selection.	Critical	Immediate	Open	1. Navigate to "Placement Preferences". 2. Open dropdown. 3. Observe list does not load.	Developer B
003	**Performance Issue in Results Page**	Results page takes over 3 minutes to load for large batches of students.	Major	Medium	Open	1. Go to "Placement Results". 2. Load batch with 500+ students. 3. Observe slow load time.	Performance Team
004	**Invalid Resume Upload Format**	Resume upload allows unsupported file types like `.exe` and `.dll`.	Major	High	Open	1. Navigate to "Upload Resume". 2. Upload `malicious.exe`. 3. Observe file is accepted.	Developer C
005	**Interview Slot Overbooking**	System allows overbooking interview slots beyond available capacity.	Critical	Immediate	Open	1. Schedule interview slots for students. 2. Book beyond slot limit. 3. Observe overbooking.	Developer D

This table consolidates five critical/major bugs identified in the **Placement Module** of a system. Each row provides:

- **Bug ID and Summary**: A quick reference to the issue.
- **Description**: Clear details about the problem.
- **Severity & Priority**:
    - **Critical**: Needs urgent fixing (e.g., overbooking and dropdown not loading).
    - **Major**: A serious issue but not system-breaking (e.g., invalid input handling).
- **Steps to Reproduce**: Useful for developers to quickly replicate and fix the issue.
- **Assigned To**: Developer or team responsible for fixing the bug.

Creating and checking the bugs in the Placement Module is important for developing and providing high quality software. Every issue is described in the system using a summary, what the problem is, how bad it is, how to repeat it and what its priority is. With this process, both developers and testers know what the problem is and how it influences users. These problems include uploading a resume that does not meet the requirements or having more candidates than time in the interview stages. Assigning roles to teams or developers in the table ensures they are properly held responsible. With an open table, finding and solving bugs happens quickly and everyone becomes happier with the finished product. Should these issues be handled beforehand, the Placement Module can be used efficiently and with greater security by students, administrators and companies.

CHAPTER 7

RESULT AND DISCUSSION

Impact and Benefits of the Placement Module

In order to reduce manual labour, improve user experiences, simplify data management, and increase transparency for both recruiters and students, the Placement Module was designed to automate and streamline the recruitment process, resulting in significant improvements across multiple system dimensions. The system, which was developed using technologies like HTML, CSS, JavaScript, Bootstrap, SQL, and REST APIs, produced significant improvements that helped to make recruitment processes more efficient. Below, we examine the specific benefits and effects of the Placement Module.

1. Improved Efficiency

One of the most significant accomplishments of the Placement Module was the tremendous boost in operational efficiency. Prior to the implementation of the module, the placement process was largely manual, with a lot of effort and time spent on job advertisements, student applications, and interview scheduling. The coordinators would typically find it difficult to accomplish these tasks efficiently, leading to delays and administrative challenges.

The Placement Module minimized the need for man power through some automation of the hiring process's most critical aspects. Job advertisements could now be directly posted onto the site, making it easier for the recruiters to contact possible candidates without having to use the traditional methods of advertising like through phone or email. Similarly, students could apply online, with the system automatically screening and filtering through their applications. Interview scheduling was also computerized, with the recruiters able to select available time slots and automatically schedule students for interviews.

As a result, coordinators spent less time processing, since repetitive administrative tasks were mechanized. With fewer minutes lost on manual processing, the team could spend more time on higher-order activities such as candidate selection, communication, and follow-up. Improved organization was also facilitated by having the entire recruitment process within one platform, allowing all stakeholders to have access to real-time information at any point in time.

2. Improved User Experience

The Placement Module was created with a view to keep the user experience high so that recruiters and students would easily and effectively use the system. The user interface was developed using HTML, CSS, JavaScript, and Bootstrap in order to develop a responsive, clean, and intuitive interface. By doing so, the system not only looked good but was also accessible across different devices and screen sizes like smartphones, tablets, and desktops.

To the students, the system gave them an intuitive user interface through which they could easily navigate through job postings, apply to employment opportunities, and monitor application progress in real-time. The system was also responsive so that students could be able to access the system using any device, making it easy for them to apply to job opportunities and monitor application progress irrespective of where they were or at what time they needed to access the system.

Recruiters were also favored because of the simple interface, which enabled them to post jobs easily, filter student applicants, and arrange interviews. Other features such as real-time messaging and auto-tracking enhanced user experience by allowing effortless interaction between recruiters and students. Real-time messaging enabled direct interaction between recruiters and students via the portal, thus enabling rapid clarifications of doubts and instant responses. Auto-tracking was advantageous to both the recruiters and the students in tracking key milestones like application submission, interview scheduling, and final selection status. This ensured that all the concerned parties remained active and informed throughout the recruitment process.

3. Improved Data Management

Adequate data management was one of the Placement Module's basic strengths. Under the Placement Module system, handling student data, job postings, and application status usually was sluggish and disorganized and required hand typing and unwieldy file storage
configurations. In the Placement Module, all these chunks of data were consolidated in an SQL database with encryption to ensure that it is properly indexed, readily accessible, and securely stored.

The core database provided one point of reference for students and recruiters to view the information they required. Students could view their profiles, modify their resumes, and track the status of their applications, while recruiters could view full student profiles, application files, and interview calendars in one location. The single-platform setup provided simple elimination of errors and duplications, whereby all the information was correct and current.

Moreover, the use of REST APIs facilitated smooth data exchanges between the system components. The APIs facilitated data interaction between the Placement Module and external databases and services, thus making exchange of information between the recruiter interface and student interface feasible. Smooth data interchange enhanced the reliability of the system through the minimization of data inconsistency chances and offering users correct, real-time data.

4. Greater Transparency

The hiring process should be transparent and truthful to build recruiters' and students' trust and confidence. The Placement Module ensured transparency through real-time feedback to recruiters and students on the application process and enabling them to monitor the application status at each stage.

There would be no doubt or uncertainty about the hiring process as students could easily see if their applications were accepted, read, shortlisted, or rejected. The students felt more empowered and informed after being able to see this, which reduced their anxiety levels related to waiting for answers or fearing that their applications were being overlooked.

Hirers also gained from the transparency as they could receive structured, unambiguous information on each candidate's participation in the hiring process. This allowed each candidate's step in the process to be more sensitive and also allowed for informed decision-making. Secure authentication practices also protected student profile and hiring information privacy by making sure that key information could be accessed only by authorized staff.

5. Simplified Recruitment Process

The recruitment process must be transparent and honest to maintain recruiters' and students' confidence and trust. The Placement Module increased transparency by providing recruiters and students with

immediate feedback on the application process and allowing them to track the status of their application the overall goal of the Placement Module was to simplify the hiring process for all. Technology cut coordinators', recruiters', and students' workloads substantially by automating most critical functions like posting jobs, applying, and interviewing scheduling. The system gave one, unified interface that enhanced data management, collaboration, and transparency to finally achieve a more efficient hiring process.

Streamlined processes saved the recruiters' and the students' time, with the students having time to spend to acquire the best opportunities and the recruiters having time to spend to acquire the best candidates. Eliminating redundant tasks and more interaction with more real-time messaging and updates, the Placement Module delivered greater user satisfaction, leading to better results for all the stakeholders.

In short, the Placement Module solved many recruitment process pain points that provided high efficiency, user-friendliness, data management, transparency, and process ease as a whole. The ability of the system to automate redundant processes and increase the efficiency of communication has not only streamlined the recruitment process but also enhanced both the experience of the recruiter and student and thus made the placement process successful.

CHAPTER 8

CONCLUSION AND FUTURE SCOPE

The overall operation and user interface of the placement module have been significantly improved for both students and recruiting coordinators through the design and implementation of new features. Some of the new features include:

1. **Selection Probability:** It gives students a quantifiable measure of their options, allowing them to make informed decisions and broadening their horizons. Focusing on such previous test scores, coding platform performance- Leet Code, Hacker Rank, and even interview outcomes- this model actually opens their doors by considering their strengths and weakness in relation to the company's expectations.

2. Resource Sharing: We make a significant amount of environmental diversity, particularly among the shortlisted candidates who have an opportunity to exchange resources, study strategies, and experience with fellow members. This not only facilitates students getting access to pertinent and proven materials but also encompasses mentorship and peer guidance that will boost future candidates' confidence and readiness.

3**. Recruitment tracking Stage:** Students are most often lost and unclear at the recruitment stages. It provides complete visibility and transparency where each student has to go through registration, aptitude test, coding test, interview, etc. Updates and information in real time make time and preparation for each stage much simpler, which subsequently reduces stress and confusion.

All of these tools combined enable the students to be better prepared beforehand and during the placement process with greater ease, confidence, and readiness. The module benefits recruitment coordinators and companies as well by enhancing communication and coordinating work within the recruitment drive.

Future Scope

The current placement module is a great foundation for managing recruitment, but with many scopes of improvement and growth areas:

1. **AI-Powered Personalized Recommendations:** Future release of the module could be embedded with AI-driven personalize feedback for the student based on a percentage likelihood of being selected. The system may recommend a course or certification or practice questions that would raise that student's chances of getting selected within that company.

2. **Efficient Resource Sharing through Organized Content:** What we would have been a content library where people can share resources that not only exist within a firm but also by type of skill-learning (coding, aptitude, communication)-and, again, levels of experience (beginner, intermediate, advanced). This way, the next candidate could easily sort and search for needed resources.

3. **Virtual mock interview can be integrated:** Another area of improvement could be virtual mock interviews. Students could go through AI simulated technical and HR interviews according to the requirements of the company so that they could hone their skills and get real-time feedback from the authorities regarding their performance.

4. **Inter-Institution Interaction**: This module can be stretched to interact with many institutions, providing the students with greater access to a larger reservoir of combined resources and knowledge base. It would thus create a broader learning and preparation network across institutions.

5. **Advanced Analytics in Career Services:** Advanced analytics and dashboards can be provided for career services and recruiters to enable them to make better decisions. Recruitment trends, student performance, areas where the students require extra training or any additional resources, will all be reflected, which may then lead to more effective placements and better-prepared candidates.

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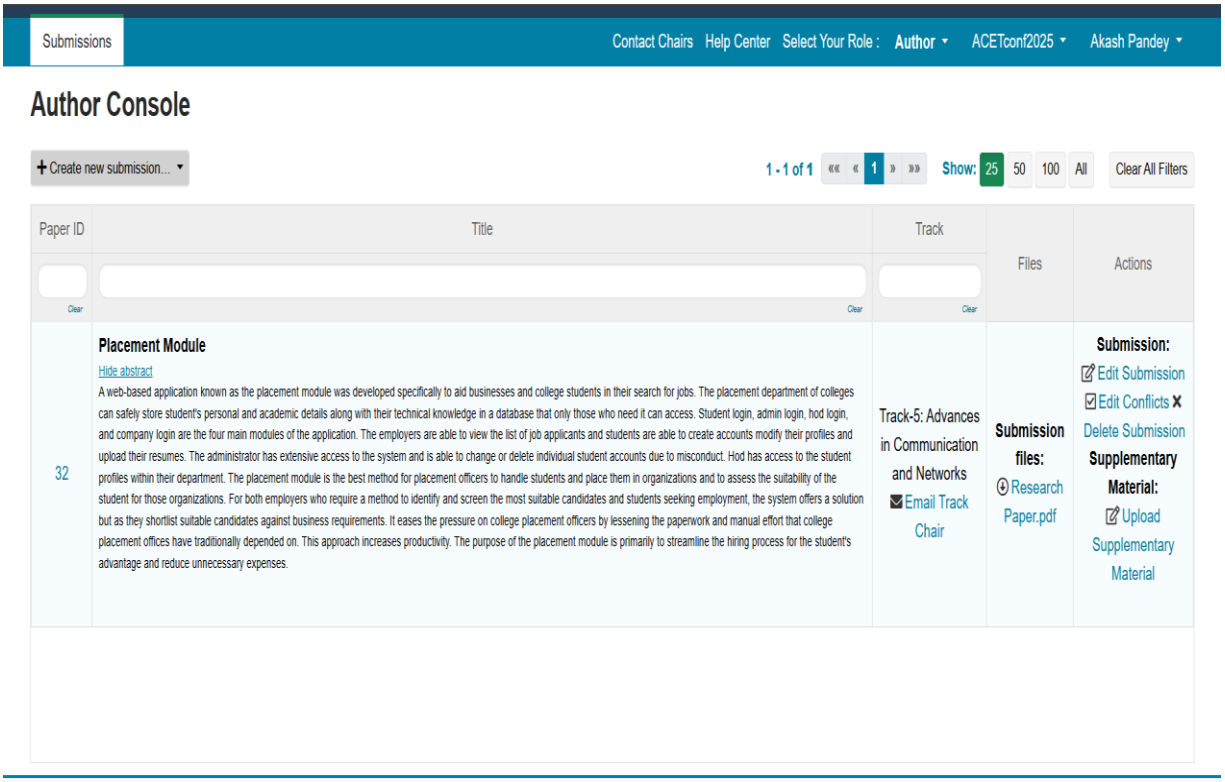

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FIELD OF INVENTION	COMPUTER SCIENCE
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