

CareerAlytics Placement Engine

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Abstract— Every day, as technology advances, manual tasks are swiftly being taken over by more efficient and automated systems. Colleges are adopting this digital system to improve their college-related placement activities. This system provides an AI platform that benefits both the college and the students to enhance their placement operations. The application provides two separate dashboards for students and placement officers. Students can register and login to the system and can see all the jobs opportunities and apply for these jobs only when they meet their required criteria. Students can view the details of all the students placed year-wise and branch-wise. This system also provides a platform where students can interact with placed students and get information about the company placement and its process. The application offers students a platform where they can upload their resumes and receive improvement suggestions on their resumes, and they will get job recommendations based on their skills and tech-stack mentioned in their resumes. The system provides a platform where students can generate resumes based on their tech stack and skills, make necessary changes, and generate a resume. The application offers students a platform where they can prepare topic-based questions for interviews and can also ask follow-up questions and their details using AI. The platform helps students prepare for their interviews, where they can prepare for both written and AI-based interviews and receive feedback on each answer and overall interview performance, with the system indicating areas of improvement. Placement officers can login to the system and manage and see detailed reports of placement branch-wise and year-wise placement percentages. Placement officers can create company visits and can reject or approve the applications based on their selection in the company. The platform also provides a comprehensive analytics dashboard where every placement detail is shown using graphs and charts, which helps in detailed reviews. The technologies used for this are Spring Boot and GROQ AI for the backend and React for the frontend.

Keywords—AI in Recruitment, Resume Parsing, Intelligent Interview System, Mock Interviews, Placement Prediction, Spring Boot, React.js, Python, PostgreSQL, Scalable Web Application

I. INTRODUCTION

The education into employment transition is an important stage of a student and the placement cell is at the centre of the process of facilitating the transition. In spite of this significance, a lot of institutions continue to rely on conventional or semi-digital processes, which delays the process of coordination and restricts the quality of services provided to students. Such disjointed systems normally do not come with intelligent evaluation, real-

time insights, and real-time feedback, which have become very important in the present competitive world of hiring. Although technology has grown rapidly in areas such as digital learning and AI enhancement, the placement cells of colleges still use traditional method that lack modern hiring practices. They rarely use features like resume-based job suggestions, topic-based preparation and AI driven interview.

To fill these gaps, this paper offers an AI-Enhanced Placement Management System that is speedup to streamline and modernize the placement activities. The platform combines AI with a powerful technology stack like Spring Boot, React.js, Redis, Python, and PostgreSQL, to provide a flexible, scalable and smart solution.

The system will provide automatic resume analysis and improvement areas in resumes, determine the skills of candidates, and give them suggestions accordingly, as well as job recommendations. It also have a resume generation feature that generate the resume based on there technology and provide resume according to industry standard. The system will feature a communication based chatbot that provide question and answer based on related topics. It also has AI- assisted mock interviews feature that can conduct interview via chat and video and has detailed feedback on every answer and overall performance.

The admin will have a secure, role-based access to dashboard and manages overall placement activities. The admin dashboard will have a detailed information about the placement activities in college such as overall placement percentage branch and year specific and also admin can see each student's detail regarding whether they are placed or not. It also has a platform where the detail of placement shown using the detailed graph and charts. The admin will reject or approve the student applications based on their selection in the company. The student will receive instant messages via email about the selection or rejection of their applications.

Having its modular structure, easy-to-use interface, the focus on automation and intelligent support, the offered system contributes to the improvement of the student experience and the administrative processes greatly,

offering a modern and complete solution for today's placement needs.

II. LITERATURE SURVEY

The 2025 paper presents a current web-based Campus Placement Recruitment System that will streamline and centralize the operations of students, recruiters, and the administration. It relies on data analytics, automation, and mobile access to overcome the inefficiencies of the traditional and early web-based placement methods. The system simplifies the management of student profile, job application, interviewing and real time communication by having specific modules of Admin, Students, Placement officer and HODs. On the whole, it strengthens efficiency, precision and coordination within the whole ecosystem of placements [1].

The article by Rohit Bansal (2017) explores the concept of campus recruitment as an important connection between academic education and employment, and how the latter provides students with direct ability to find a job. The paper defines recruitment concepts, processes, types, goals and myths that myth-busters have about hiring on campuses. It underlines the importance of effective training, organized selection phases, and effective interaction between college and company in order to enhance the results of the placement. The research concludes by arguing that both the students and the institutions have to work together to break the wrong assumptions and make the campus recruitment more efficient [2].

The paper by IRJET (2020) introduces an Online Training and Placement System that will automate the operations of the college placement cell, such as student registration, profile verification, interaction with companies, and managing eligibility. The system has its student, company and administrator dedicated modules where the students upload their CVs, the companies are also provided with the CVs, there are online exams to be undertaken by the student and the real time updates are made by the use of SMS and email in the system. The system makes the process of recruitment more efficient, faster, and provides a secure and user-friendly platform to manage placements through increased efficiency by minimizing manual errors and improving communication [3].

The IJEDR (2014) article presents a web-based College Admission System to computerize and automate the admission, record keeping, notification and communication system of a student in an institution. The system will substitute the paper-based operating system with a central online system that has unique ID allocation, integration of mobile apps with the system, and secure access by the students, administrators, and office departments. It also streamlines the admission processes and provides quicker access to data and enhances interdepartmental coordination in the academic divisions with cloudbased communication and automated communications [4].

The IJRASET (2021) paper introduces a web-based Placement Management System that will automate the operations of the college placement cell and make it streamlined. It gives individual student, administration and company modules where online registration, updates to profiles, eligibility-based filter and centralized job postings can be done. The system will be used to substitute manual and error-prone procedures with automated data processing, search, and sort options, notification messages, and the enhanced communication. Generally, it will make the functions more efficient, less paperwork, and will help the operations of placing to occur faster and more accurately [5].

III. METHDOLOGY

It used a stage-based approach to system development which made it clear, reliable in processing, and scalable in deployment. It started with the requirement elicitation step when the requirements of students, placement coordinators, and administrators were collected by discussing their needs, analysing documents, and observing the workflow. These insights were utilised to indicate functional and nonfunctional requirements and to establish the system boundaries. After the requirements were complete, the blueprint of an architecture was drawn according to a layered design pattern so that the presentation, business logic and data management modules and the integration module worked in isolation and in a collaborative manner.

At the second step, data modelling in detail came to be done to reflect the connections among users, student profiles, applications, company visits, interview workflows, and placement records. Interactions between the system components were mapped in entity-relationship diagrams and workflow models. The development followed the principles of servicedriven design and APIs based on the REST were developed in order to support a modular backend that would be able to seamlessly interface with external systems, including email gateways, SMS services and AI-driven analytical engines.

The AI components adhered to another methodology which was on prompt engineering, natural language understanding, and controlled response generation. The work with resumes was conducted in a structured pipeline, which started with the text conversion of PDF files, heuristic parsing, and pattern recognition, and ended by feedback generation with the help of LLM. The mock interview module, similarly, followed a performative paradigm, that is, question generation, answer retrieval, analysis of responses, and scoring through the use of AI in the background, but maintains the workflow entirely under the control of the backend services.

Unit tests, integration tests and API-level validations were used to test it at various stages. Security testing has provided strict access controls, token validation and safe data handling. After validation, the application was containerized and ready to be deployed with monitoring, logging, and tracing services in order to make it reliable in the operation environments.

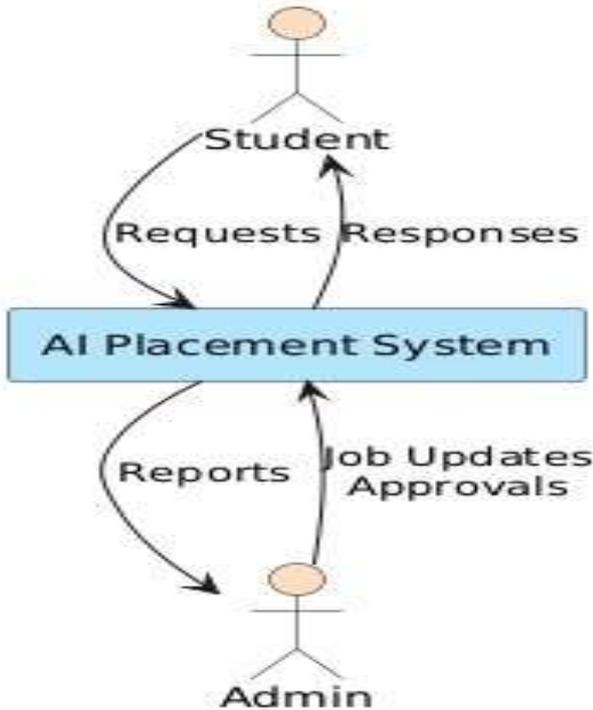


Figure 1. Level 0 Data Flow Diagram

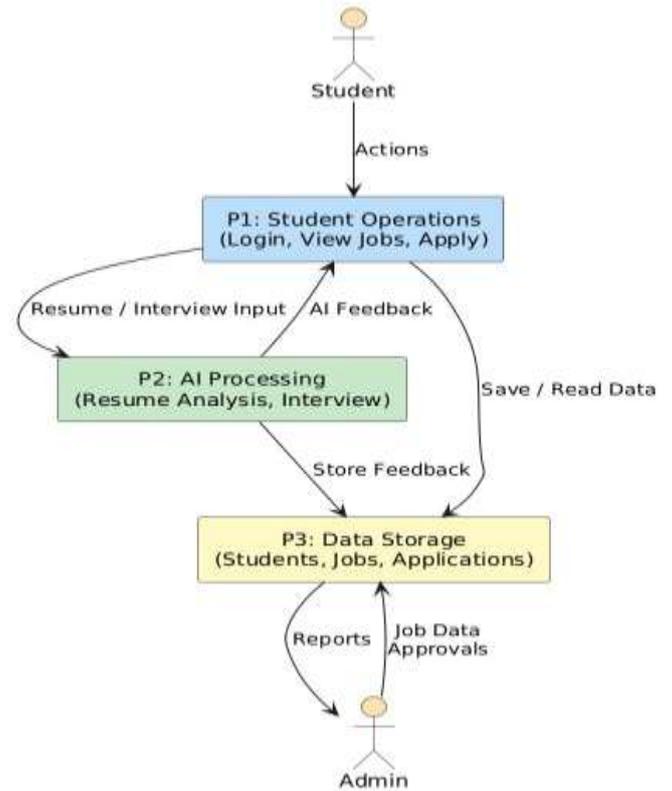


Figure 2. Level 1 Data Flow Diagram

IV. IMPLEMENTATION

It was developed on the basis of the Spring Boot framework, which is the central part of the system since it is very modular, robust, and free of incompatibility with contemporary enterprise practices. The design features a clear separation of layers. REST controllers handle HTTP communication. Service classes contain all business logic. Repositories manage database operations using JPA and Hibernate. The integration layer connects with external services, such as email, SMS, and AI inferencing APIs. PostgreSQL was employed as the main data warehouse, with well-thought-out structures to ensure the integrity of data among the records of students, company visits, application, interview and placement history. To help in high-performance queries, especially used in analytics and reporting, indexing and relationship constraints were put in place.

The security was implemented by means of the spring security and authentication by a JWT so that every endpoint that had to be considered in the user's specific manner remained secure. BCrypt hashing is used to store passwords in a secure manner and role-based access control is used to give both students and administrators access privileges. The application interacts with third-party applications like Twilio to send SMS and Gmail SMTP to send email notifications. Such integrations are done with clear services with a recovering mechanism of retries and

error handling to make it reliable even with changing network conditions.

The integration of AI was managed by a specific service layer that communicates with the Groq LLM API. The resume analysis is done through uploaded PDF files processed with Apache PDFBox, extracted useful information, and subsequent production of AI-assisted suggestions and job matching results. Questions to be used in an interview and the answer evaluation are generated in similar ways, with the prompts being designed within the backend and evaluated asynchronously to ensure non-blocking processes with Web Client. Caching strategies, asynchronous communication that uses RabbitMQ, and distributed tracing in Zipkin are also involved in the system to guarantee its observability and enhance performance in a runtime environment.

The system is frontended with react.js to offer an interactive, responsive, and component-based user interface to both the students and the administrators. React is compatible with backend API, with Axios to be used to fetch data and the Context API to manage states. In the case of placement analytics, dashboards, and administration insights, the system uses dynamic visualizations: Recharts and Chart.js. These figures present the percentages of placements per branch and year, the number of applications made by the students, and the number of visits to the company. Other functions that the user can access, like resume generators, interview practice interfaces, AI chat-based query modules, and job recommendation pages, were

designed with reusable UI components. React Router

Figure 3. Application Flow Diagram provides a smooth flow of the navigation between

modules, and form validation; file uploads parts, and a real-time status display make the whole usability even more convenient.

Application Flow Diagram - Placement Management System

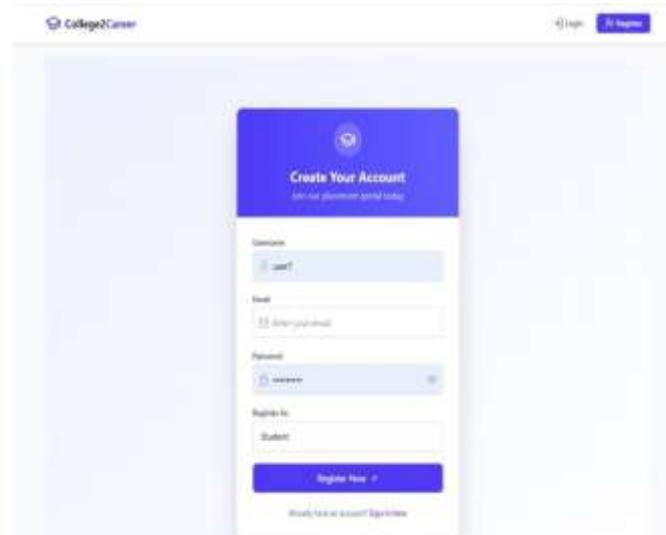
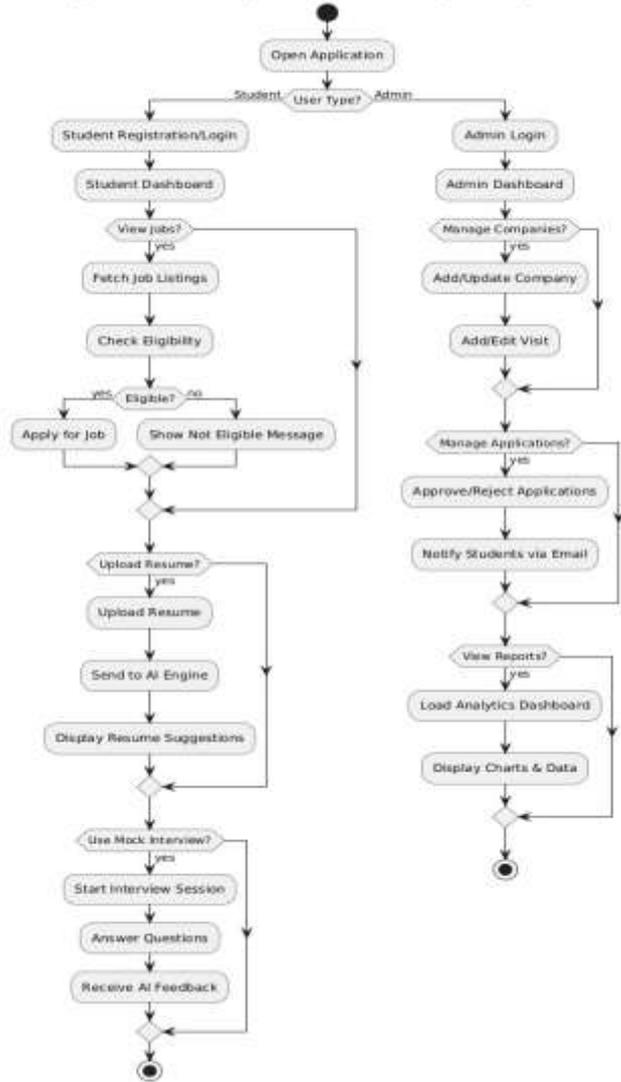


Figure 4. User Registration



Figure 3. User Login

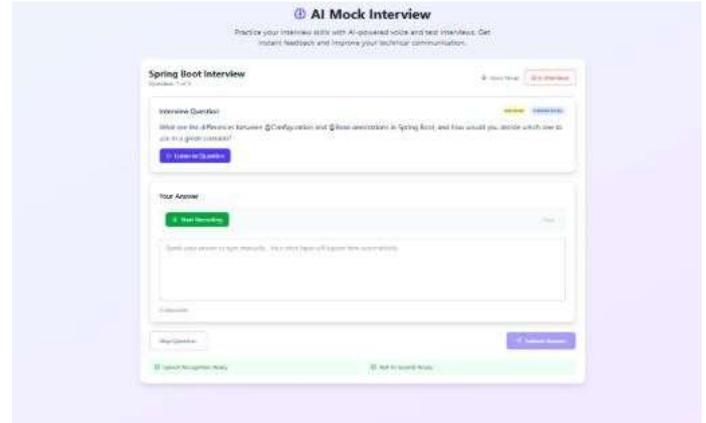


Figure 8. AI Mock Interview

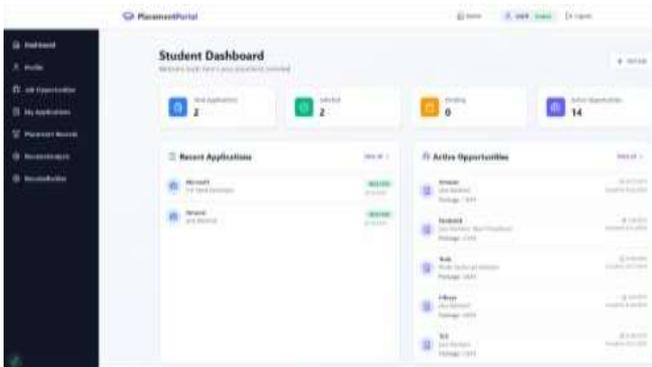


Figure 5. Student Dashboard exploration and application tracking. A robust resume analysis pipeline intelligently interprets student

V. CONCLUSION

The AI-Enhanced Placement Management System provides a modern, unified, and student-focused solution to the limitations of traditional placement platforms. It streamlines the entire placement lifecycle by integrating intelligent modules, responsive interfaces, and a scalable backend. The platform delivers dedicated dashboards for students and administrators, supporting all major activities—from skill development and resume preparation to job

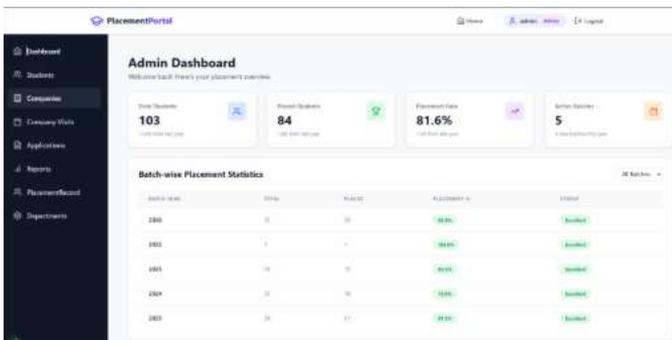
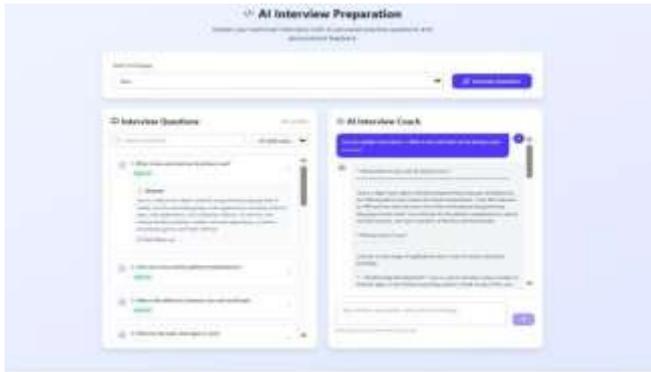


Figure 6. Admin Dashboard Spring Boot, React.js, Python, and PostgreSQL, the architecture ensures high performance, secure access

profiles, identifies key competencies, recommends improvements, and aligns candidates with suitable job roles. To strengthen interview readiness, the system includes a virtual and chat-based mock interview environment that simulates real interview scenarios and offers detailed feedback for each response, along with overall performance insights. A personalized learning component, powered by a dynamic topic-wise question bank and an interactive conversational assistant, enables students to study technical concepts more effectively than with static materials. Built on



7. AI Interview Preparation

through JWT authentication, and smooth scalability to support large numbers of users concurrently. This holistic design significantly enhances both user experience and administrative efficiency within the placement ecosystem.

VI. REFERENCES

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