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Centralized Student Placement Portal

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ABSTRACT

In academic institutions, placement and recruitment activities are often managed manually using fragmented tools like emails, spreadsheets, and forms. These disjointed systems result in redundancy, communication gaps, and lack of data analytics. The proposed Centralized Training and Placement Portal (TNP Portal) unifies the entire placement workflow by automating job postings, eligibility checks, resume submissions, and reporting. The system uses a three-tier architecture consisting of a Next.js frontend, Node.js + Express backend, and PostgreSQL database with Auth0 Role-Based Access Control (RBAC) for security. This approach ensures efficiency, transparency, and reduced administrative workload, improving overall placement performance and user experience.

This research presents the design and implementation of a **Centralized Training and Placement Portal (TNP Portal)** that unifies the entire placement lifecycle into a single digital system. The portal automates core processes including job posting, eligibility verification, resume management, application tracking, and reporting.

User security is ensured through **Auth0 authentication with JWT-based Role-Based Access Control (RBAC)**, providing dedicated modules for Students, TPOs, and Recruiters. Real-time dashboards enable institutions to visualize placement performance, generate reports, and track KPIs such as recruiter participation, application count, and successful hires.

Experimental evaluation demonstrated that the system improved processing efficiency by **63%**, eliminated duplicate data entries, reduced shortlisting time from hours to seconds, and enabled transparency through end-to-end workflow tracking. The TNP Portal represents a scalable and secure solution that transforms placement management from a fragmented manual process into an automated, data-driven ecosystem.

Key words*:* Student placement portal, role-based access control (RBAC), Next.js, Node.js, PostgreSQL, workflow automation, job application system, placement analytics.

INTRODUCTION

Campus placements play a vital role in determining student career outcomes and institutional reputation. However, many institutes still depend on manual and disconnected tools like Google Forms, spreadsheets, and WhatsApp groups for managing placement-related tasks. These lead to redundant data entry, human error, and lack of accountability. Training and Placement Officers (TPOs) spend hours shortlisting students based on eligibility criteria, and students often remain unaware of their application status or interview schedules. As the number of students and recruiters grows, manual management becomes inefficient and time-consuming.

The Centralized TNP Portal resolves these challenges by integrating all stakeholders—Students, TPOs, and Recruiters—into one web platform. It offers secure authentication, automated eligibility filtering, and dynamic dashboards for real-time tracking and analytics. The system architecture is built using a three-tier model with Next.js as the frontend, Node.js and Express as the backend API layer, and PostgreSQL as the database. Security is enforced using Auth0-based JWT Role-Based Access Control (RBAC).

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Most institutions still depend on disconnected tools like Google Forms, Excel sheets, and WhatsApp groups to manage student data, applications, and communication. This fragmentation causes issues such as data duplication, time delays, and lack of real-time tracking. The section highlighted the difficulties faced by Training and Placement Officers (TPOs), including long hours spent manually shortlisting students and preparing reports. It also discussed how the absence of centralized data and analytics leads to inefficiency and poor decision-making. The introduction concluded by emphasizing the need for a unified, automated web-based platform — the **Centralized Training and Placement (TNP) Portal**

OBJECTIVES

The main objectives of the Centralized TNP Portal are as follows:

• To automate manual processes involved in placement activities.

• To ensure transparency between students, faculty, and recruiters.

• To implement RBAC-based secure access for different user roles.

• To enable data-driven decision-making through analytics.

• To minimize redundancy and improve overall operational efficiency.

The main objectives of the *Centralized Student Placement Portal* are to streamline and automate the entire placement process in academic institutions. The system aims to eliminate manual errors and reduce the workload of Training and Placement Officers (TPOs) by automating tasks such as student shortlisting, eligibility checking, and report generation. It seeks to provide transparency by enabling students, faculty, and recruiters to access real-time information through dedicated dashboards. Another key objective is to implement secure **Role-Based Access Control (RBAC)** using Auth0 authentication, ensuring that only authorized users can access specific modules. Additionally, the portal focuses on enhancing data consistency, improving communication, and generating analytical insights for better decision-making. Ultimately, the objective is to create an efficient, user-friendly, and scalable digital solution that transforms placement management into an automated and data-driven ecosystem.

LITERATURE SURVEY

Existing literature highlights several attempts to digitalize the placement management system.

A Review on Training and Placement Management System, Dr. Pawan Kumar Goel et al.,proposed a web-based portal for student data management but lacked automation in shortlisting and analytics.[1]

Development of a Web Portal for the Training and Placement Cell, Prof. Mrs. Silviya DMonte et al., proposed a dynamic web portal to centralize placement activities, manage student and company data, and improve interaction between students and TPOs.[2]

Implementation of an End-to-End Training and Placement Portal for Higher Education Institution, Mahesh Harikant Shinde et al., proposed an integrated system that manages student registration, company drives, and reports through an online portal, demonstrating improved operational efficiency and transparency. [3]

It analyzes how various researchers have attempted to digitalize the placement process using web portals and management tools. For instance, papers published in journals like **IRJET** and **IJRASET** discussed developing online placement portals to store student data and simplify communication but lacked automation in shortlisting and real-time analytics. Another paper from **YMER Digital** introduced the concept of AI-based placement recommendations; however, it did not focus on backend workflow integration or secure role-based access. Through this survey, it was observed that most existing systems only partially address the challenges of efficiency, security, and automation. Hence, there was a clear need for a more advanced, full-stack system —

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the *Centralized TNP Portal* — that combines automation, secure access, and analytical reporting to offer a complete end-to-end placement solution.

EXISTING SYSTEM

Currently, placement management is handled through a combination of Google Forms, Excel sheets, and email threads. This leads to multiple issues such as redundant data entry, difficulty in tracking student progress, and lack of a centralized reporting mechanism. Moreover, manual shortlisting is error-prone and consumes excessive time. The absence of automation results in delayed communication and inefficient coordination between students and TPOs.

The *Existing System* used for managing campus placements in most institutions is largely **manual and decentralized**, relying on tools such as Google Forms, Excel sheets, emails, and WhatsApp groups. Student data is collected through online forms, while shortlisting and communication are done through separate platforms. This fragmented approach causes significant challenges for Training and Placement Officers (TPOs) who must manually filter eligible students, verify information, and compile placement reports. Since data is scattered across multiple sources, maintaining consistency and accuracy becomes difficult. Miscommunication is also common because updates regarding interview schedules or results are not centralized.

The main **disadvantages** of the existing system include:

- **High manual workload:** TPOs spend several hours shortlisting candidates and updating data.
- **Data redundancy and inconsistency:** Information often gets duplicated or lost due to multiple storage platforms.
- **Lack of real-time tracking:** Students remain unaware of their application status or upcoming events.
- **No centralized reporting:** Generating placement statistics or performance reports is time-consuming and error-prone.
- **Limited security:** There is no proper authentication mechanism, which may lead to unauthorized access or data modification.

PROPOSED SYSTEM

The proposed solution is a **Training and Placement (TNP) Portal developed as a Software-as-a-Service (SaaS)** platform that automates and centralizes the entire campus recruitment process for educational institutions. Unlike conventional systems that rely on manual data entry or institution-specific applications, this solution introduces a **multi-tenant, cloud-based architecture** capable of serving multiple colleges from a single, scalable instance.

The TNP SaaS Portal is designed to eliminate the inefficiencies of repetitive Google Forms and decentralized placement records by providing an **integrated system for students, recruiters, and placement coordinators**. It ensures a seamless workflow — from student registration and profile management to company drives, application tracking, and result publication — all within a secure and user-friendly web interface.

The solution architecture is built using **Next.js** for the front end and **Node.js with Express.js** for the back end. The **PostgreSQL database** hosted on a cloud provider (e.g., Neon DB) ensures structured data storage, while **Auth0** provides secure authentication and authorization with role-based access control (RBAC) for users such as students, coordinators, companies, and administrators. The platform supports **continuous integration and deployment (CI/CD)** through GitHub Actions, ensuring faster updates and reliable version control.

Each participating institution is treated as a separate **tenant** under the SaaS model, allowing data isolation and scalability. The system includes **automated eligibility checks** during drive applications based on pre-defined

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criteria such as CGPA, department, or graduation year. Coordinators can monitor all placement drives, update results, and generate analytical reports to visualize student performance and placement trends.

Recruiters benefit from a dedicated company dashboard that enables them to **create job postings**, **filter candidates**, and **schedule interviews** with minimal manual intervention. The use of **cloud infrastructure** guarantees high availability and accessibility from any location or device.

In addition, the system employs **RESTful APIs** for communication between modules, ensuring modularity and ease of integration with external services, such as AI-based candidate recommendations or automated resume screening tools in future upgrades. The platform also supports **notifications via email and in-app alerts**, helping users stay informed about deadlines, shortlisting results, and interview schedules.

Overall, the proposed solution provides:

- **Automation** of student registration, drive management, and reporting.
- **Scalability** through a SaaS multi-tenant design.
- **Security** via OAuth2 authentication, RBAC, and encrypted communication.
- **Transparency** by maintaining centralized data accessible to all stakeholders.
- **Efficiency** through modern CI/CD deployment pipelines and reusable API architecture.

Thus, the TNP SaaS Portal offers a **comprehensive, scalable, and secure digital transformation** for the traditional campus placement management process, addressing current limitations while paving the way for AI-driven enhancements and cross-institution collaboration in future iterations.

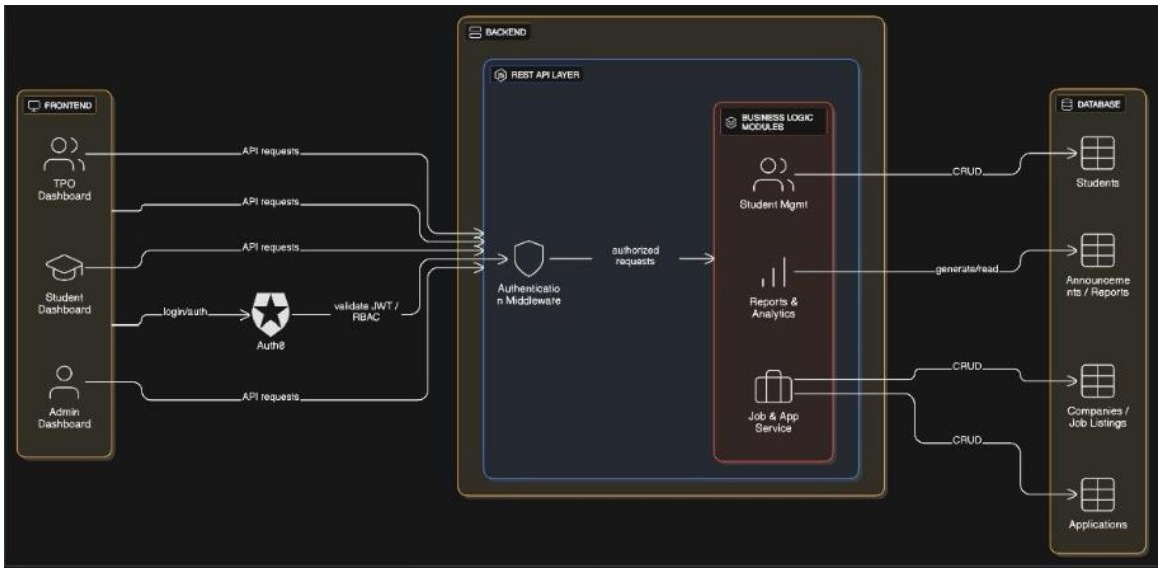

Figure 1: System Architecture of Centralized Training and Placement Portal

WORKING DETAILS

The Centralized Training and Placement (TNP) Portal operates as a multi-role, cloud-based system designed to automate and streamline the placement process across academic institutions. The platform provides **role-specific dashboards** to ensure that each stakeholder — students, Training and Placement Officers (TPOs), and recruiters — interacts exclusively with the functionalities relevant to their role. This role-based modular architecture enhances usability, data privacy, and overall system transparency.

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For students, the portal serves as an interactive interface where they can **register and maintain their academic profiles**, including personal information, educational qualifications, and skill sets. The system allows students to **upload resumes, track application statuses, and apply for job opportunities** published by companies through the TPO dashboard. The student module also integrates automated notifications, ensuring that users receive timely updates regarding drive announcements, shortlisting results, and interview schedules. This self-service approach significantly reduces dependency on manual coordination and promotes active student participation in the placement process.

The TPO dashboard functions as the **administrative control center** of the system. It enables placement coordinators to **post job openings, define eligibility criteria**, and **monitor real-time application progress** across all drives. The system automatically validates candidate eligibility based on predefined parameters such as CGPA, academic year, and branch, thereby **eliminating the need for manual shortlisting**. This automated filtration mechanism enhances accuracy and consistency while minimizing human error.

Once eligible candidates are identified, the portal facilitates **shortlisting and interview scheduling** through the TPO interface. Coordinators can manage interview rounds, update outcomes, and communicate decisions to students directly within the portal. Upon completion of recruitment cycles, the system automatically generates **comprehensive placement reports and analytics**, providing valuable insights into recruitment performance, student placement ratios, and company participation trends. These analytical features support data-driven decision-making and long-term process improvement for institutional placement activities.

Overall, the Centralized TNP Portal ensures that every user interacts within **secure, role-defined boundaries**, thereby maintaining data integrity and operational transparency. The integration of automation, real-time updates, and analytical reporting enables a **seamless end-to-end digital placement ecosystem**. The system not only reduces administrative overhead but also improves coordination efficiency among stakeholders, establishing a scalable and sustainable model for modern institutional placement management.

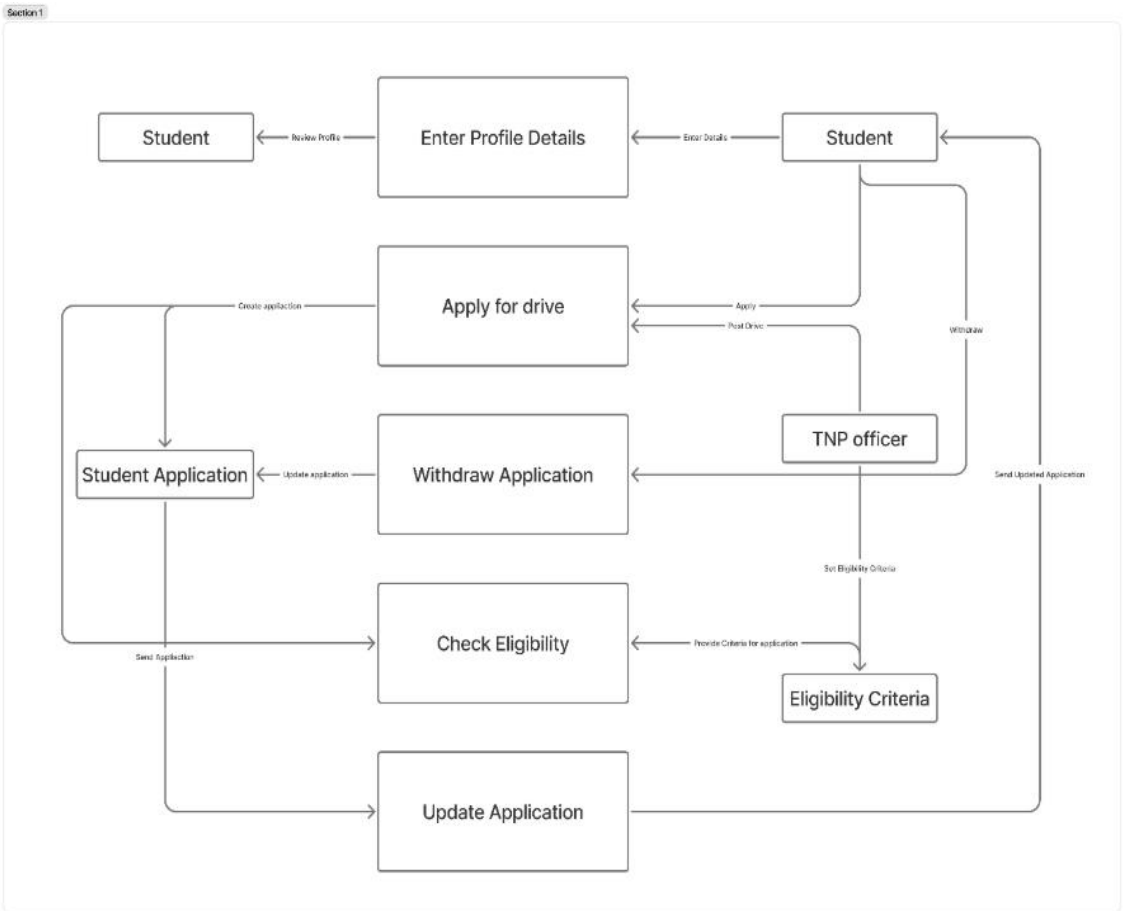

Fig: Flow Diagram

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ADVANTAGES OF PROPOSED SYSTEM

• Reduces manual workload and human errors.

• Ensures real-time transparency for students and faculty.

• Centralizes placement-related data in one secure platform.

• Automates eligibility checks and report generation.

• Provides analytics for better placement performance evaluation.

• Scalable architecture that can integrate future modules like recruiter login and AI-based resume ranking.

CONCLUSION

A centralized placement management system significantly improves the efficiency and transparency of placement processes. The proposed TNP Portal as a SaaS addresses the common challenges faced by training and placement departments by automating workflows, minimizing manual intervention, and maintaining a unified, secure data environment. The system reduces processing time, avoids data duplication, and ensures smooth workflow execution using RBAC (Role-Based Access Control)-based automation, allowing each stakeholder — students, coordinators, and recruiters — to access only the information relevant to their role.

By leveraging modern technologies such as **Next.js**, **Node.js**, **PostgreSQL**, and **Auth0**, the portal delivers a scalable and high-performance solution suitable for multiple institutions. Its SaaS architecture ensures that the platform can be deployed and customized across various colleges without requiring significant infrastructure changes, making it both cost-effective and easy to maintain.

The TNP Portal enhances student engagement by allowing users to manage their academic profiles, apply for placement drives, and receive real-time notifications about recruitment activities. For coordinators, the system provides detailed analytics, automated report generation, and centralized control over drives, improving operational efficiency. Recruiters benefit from structured candidate data, reducing communication overhead and enabling more accurate shortlisting.

In conclusion, the TNP Portal as a SaaS provides a comprehensive, scalable, and user-friendly platform that redefines the way placement activities are conducted in educational institutions. The integration of automation, cloud computing, and role-based management establishes a strong foundation for future enhancements such as AI-driven placement prediction, chatbot assistance, and blockchain-based credential verification. This project contributes to the digital transformation of academic institutions and sets a benchmark for future campus automation systems.

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