



PlacePrep - Smart DSA Learning and Placement Readiness System

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Abstract: PlacePrep is a full-stack web application developed to enhance campus placement preparation for IT students through an integrated learning ecosystem. The platform combines DSA practice, aptitude training, AI-based mock interviews, resume building, and progress analytics into a single system. It features a live coding environment, ATS-compatible resume generation, company-wise preparation tools, leader boards, streak tracking, and performance dashboards. Developed using the MERN stack (MongoDB, Express.js, React, and Node.js), the system ensures scalability and modularity through RESTful APIs and cloud integration. PlacePrep aims to improve placement readiness, streamline preparation, and increase student success rates.

Keywords:

Campus Placement Preparation, MERN Stack, Artificial Intelligence, Data Structures and Algorithms, Mock Interviews, Resume Builder, ATS Compatibility, Performance Analytics, Web Application, Placement Readiness.

INTRODUCTION

In today's competitive environment, campus placements are crucial for IT students, yet preparation is often fragmented across multiple platforms for coding, aptitude training, mock interviews, and resume building. This lack of integration creates inefficiency, poor progress tracking, and unstructured learning. To address these challenges, "PlacePrep" is developed as a centralized full-stack web platform for placement preparation.

The system integrates Data Structures and Algorithms (DSA) practice, AI-powered mock interviews, aptitude training, resume building, and company-specific preparation resources within a single ecosystem. It provides a live coding environment with real-time code execution, AI-based interview simulations with feedback and scoring, and aptitude modules covering quantitative, verbal, and logical reasoning. The platform also includes an ATS-compatible resume builder with AI-driven improvement suggestions.

Developed using the MERN stack (MongoDB, Express.js, React, and Node.js), PlacePrep follows a scalable three-tier architecture and integrates external APIs for code execution and intelligent analysis. The platform aims to enhance placement readiness, streamline preparation, and improve student success in campus recruitment.

PROBLEM STATEMENT

Students preparing for campus placements often depend on multiple disconnected platforms for coding practice, aptitude training, mock interviews, and resume creation. This fragmented approach leads to inefficiency, poor progress tracking, and lack of structured preparation. Existing solutions fail to provide a centralized system that integrates all essential placement preparation tools within a single environment. To address this issue, PlacePrep is introduced as a comprehensive placement preparation platform that combines coding practice, aptitude assessment, AI-powered mock interviews, and ATS-friendly resume building into one unified ecosystem. The platform streamlines preparation, improves accessibility, and enhances students' overall placement readiness and performance.

LITERATURE SURVEY

Existing placement preparation systems provide only limited and isolated functionalities. Online coding platforms mainly focus on DSA problem solving and coding practice but lack aptitude training, resume building, and interview preparation



features. Aptitude preparation systems support quantitative, verbal, and logical reasoning but do not integrate coding or interview modules. Similarly, mock interview platforms provide simulated interviews but offer limited personalization and insufficient AI-based feedback. Resume builder tools assist in formatting and ATS optimization but are not connected with student performance analysis.

Placement preparation portals and traditional learning systems often contain fragmented resources with minimal interactivity, tracking, or real-time analytics. AI-based learning systems provide adaptive learning but are not specifically designed for placement-oriented preparation. Backend technologies like Judge0 support secure code execution but do not offer a complete learning ecosystem. General EdTech platforms mainly focus on course-based learning rather than placement readiness.

PlacePrep overcomes these limitations by integrating coding practice, aptitude preparation, AI-powered mock interviews, ATS-friendly resume building, company-specific resources, analytics, leaderboards, streaks, and progress tracking into a single unified platform. This centralized ecosystem improves efficiency, structured learning, and overall placement readiness for IT students.

OBJECTIVE

The primary objective of the PlacePrep system is to develop a centralized and user-friendly platform that integrates all essential resources required for campus placement preparation. The system aims to provide a structured learning pathway covering Data Structures and Algorithms (DSA), aptitude, and core computer science subjects, enabling students to follow a well-organized study plan.

Another key objective is to simplify access to high-quality, curated study materials, reducing the time and effort spent searching across multiple platforms. The system is designed to enhance learning efficiency by offering easy navigation and a clear categorization of topics.

Furthermore, the platform supports self-paced learning, allowing students to prepare according to their individual schedules and skill levels. It also aims to improve overall productivity and consistency in preparation. Lastly, the system is built with a scalable architecture, making it suitable for future enhancements such as performance tracking, mock interviews, and AI-based recommendations.

PROJECT UI

The user interface of the proposed system is designed with a modern, responsive, and visually appealing layout to enhance user engagement and usability. The interface follows a dark-themed design with gradient backgrounds, smooth transitions, and well-defined components to provide a seamless user experience.

1. Registration Page (Create Account Screen)

The registration interface allows new users to create an account by entering essential details such as name, email, password, target company, target date, and skill level. Dropdown menus are provided for selecting preparation level and target date, ensuring ease of input. The form is designed with clear input fields, proper spacing, and a prominent "Register" button for user convenience. Additionally, a sign-in option is available for existing users, ensuring smooth navigation between authentication pages.

2. Dashboard Overview Page

The dashboard acts as the central hub of the application, providing users with a quick overview of their preparation progress. It displays key performance metrics such as:

- Total problems solved
- Number of problems solved today
- Current streak and best streak
- Pending and overdue tasks



These elements are presented using card-based UI components, making the information easily readable and visually structured. The dashboard also includes a revision queue and recently solved section, helping users stay consistent in their preparation.

3. Topic-wise Progress Visualization

The system includes a graphical representation of progress through a bar chart that displays the number of problems solved in each topic. Topics such as Linked List, Trees, Dynamic Programming, Graphs, and others are plotted along the axes, allowing users to visually analyze their strengths and weaknesses. This feature enhances decision-making by helping users focus on weaker areas.

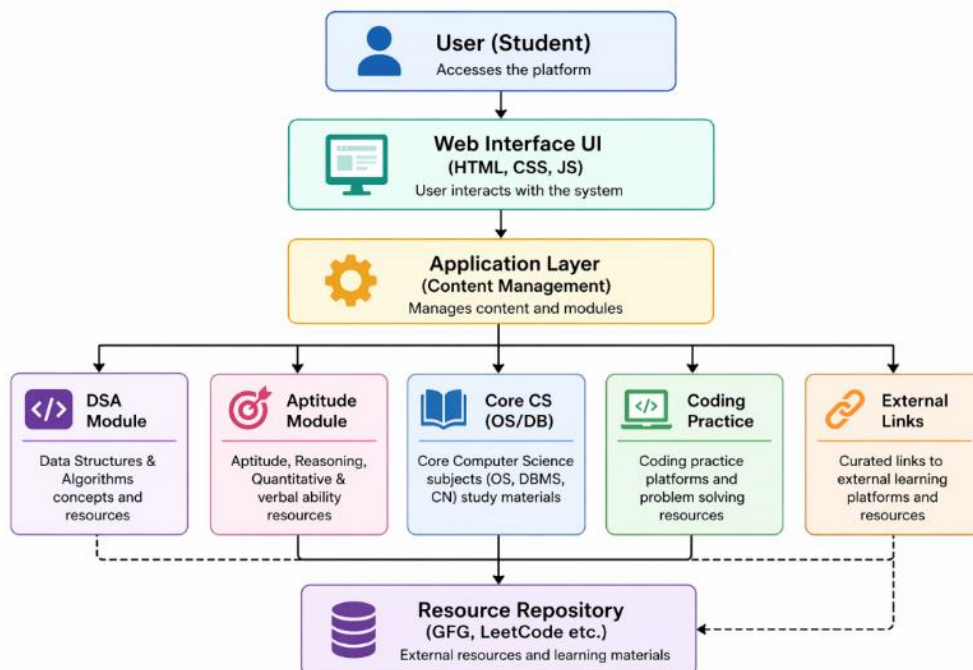
4. Weakest Topics Section

The weakest topics module highlights areas where the user has minimal or no progress. Each topic is accompanied by a progress bar and percentage value, providing a clear indication of performance. This section enables targeted learning and helps users prioritize topics that require more attention.

5. Responsive and Interactive Design

The UI is fully responsive, ensuring compatibility across mobile devices, tablets, and desktops. Interactive elements such as hover effects, dropdowns, and dynamic updates improve usability. The consistent color scheme and typography enhance readability while maintaining a professional look.

FLOW CHART



METHODOLOGY

The development of the PlacePrep system follows a systematic and structured methodology to ensure efficiency, scalability, and usability. The process begins with requirement analysis, where the key challenges faced by students during placement preparation are identified. Based on these insights, the system requirements are defined, including the need for a centralized platform integrating multiple preparation domains such as Data Structures and Algorithms (DSA), aptitude, and core computer science subjects.



In the system design phase, a modular architecture is created to organize content into well-defined sections. A user-friendly interface is designed to ensure easy navigation and accessibility. The structure focuses on categorizing topics logically, allowing users to move seamlessly between different modules.

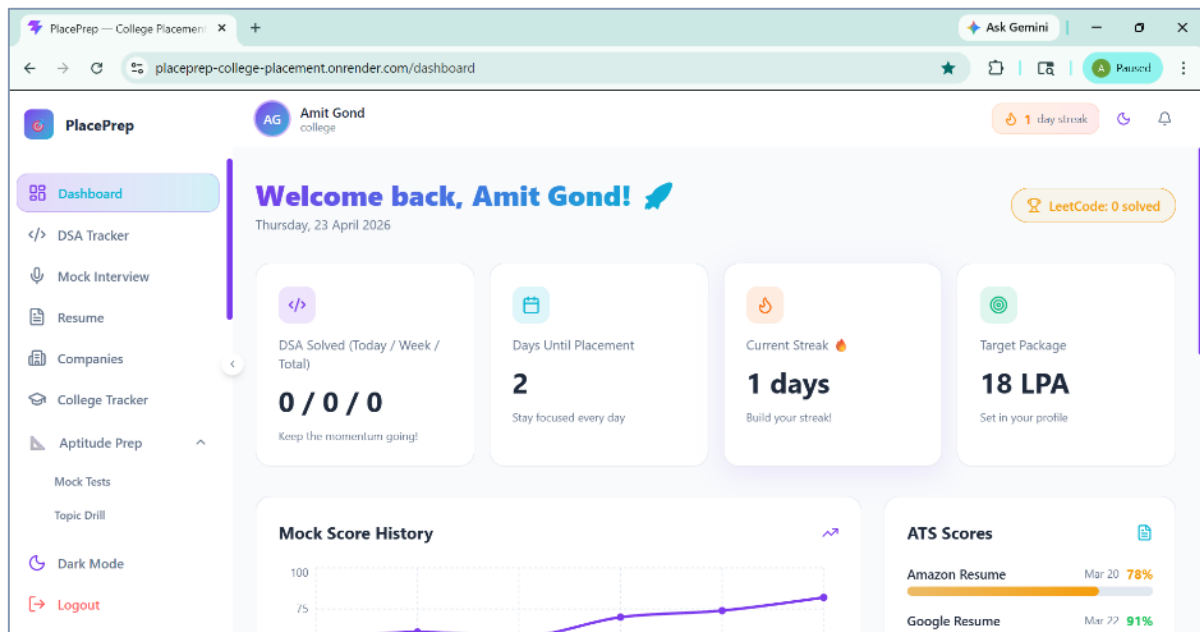
During the development phase, the frontend of the system is implemented using web technologies such as HTML, CSS, and JavaScript. Each module is developed independently and then integrated into a unified platform. External resources are linked to provide additional learning materials, ensuring comprehensive coverage of topics.

The next step involves content structuring, where study materials are curated and organized hierarchically. Emphasis is placed on clarity, relevance, and ease of understanding. This ensures that users can follow a structured learning path without confusion.

Testing is conducted to verify the functionality and usability of the system. This includes checking navigation flow, responsiveness, and compatibility across different browsers and devices. Any identified issues are resolved to improve system performance.

Finally, the system is deployed using a web hosting platform, making it accessible to users. The modular design allows future enhancements such as performance tracking, mock interviews, and AI-based recommendations, ensuring long-term scalability and adaptability of the system.

RESULTS





Title	Difficulty	Accept%	Companies	Topic
1. Two Sum	Easy	52.3%	+1	Array
3. Longest Substring Without Repeating Characters	Medium	34.1%	+1	String

CONCLUSION

The methodology ensures that PlacePrep is developed as a **scalable, secure, and user-centric platform**, combining modern web technologies and AI capabilities to enhance placement preparation.

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