IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 5, May 2025
Impact Factor: 7.67

Online Job Portal using Spring Boot Microservices

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Abstract: *The employment market is evolving, yet platforms dedicated exclusively to freshers remain scarce. This paper presents the design and implementation of a job portal web application aimed at freshers, developed using Spring Boot microservices for the backend and a React/Three.js-based frontend. The platform distinguishes itself by integrating an aptitude test module and a free mock interview service to better prepare candidates and aid recruiters in identifying promising talent. The microservices architecture ensures scalability and robustness, while the use of modern web technologies provides an engaging user experience. Experimental evaluations indicate that the system successfully streamlines the recruitment process by matching candidates' scores with job requirements.*

Keywords: Job Portal, Freshers, Microservices, Spring Boot, React, Three.js, Aptitude Test, Mock Interview, Web Application, Recruitment

I. INTRODUCTION

In today's rapidly evolving job market, fresh graduates and entry-level professionals often find themselves competing on a level playing field that favors experience over potential. Traditional job portals predominantly cater to seasoned professionals, leaving a significant gap for freshers who require dedicated support to launch their careers. This project addresses that critical need by introducing a specialized job portal designed exclusively for freshers. By integrating a comprehensive aptitude test module and a complimentary mock interview system, the platform offers a holistic approach to candidate evaluation and career readiness.

The proposed system leverages a microservices architecture built with Spring Boot, ensuring that the backend is not only robust and scalable but also capable of handling diverse functionalities such as user management, job matching, and performance analytics. On the frontend, React is utilized to create a dynamic and responsive user interface, while Three.js adds engaging 3D visual elements that enhance the overall user experience. These technological choices empower the platform to deliver real-time assessments and interactive simulations that help candidates better understand their strengths and areas for improvement.

By objectively measuring candidates' aptitude through tailored tests and providing realistic interview practice sessions, the system aims to streamline the recruitment process for employers while simultaneously boosting the confidence and preparedness of job seekers. Experimental evaluations have demonstrated that such an integrated approach significantly enhances the accuracy of candidate assessments and reduces hiring biases. Ultimately, this research contributes to creating a more inclusive and efficient recruitment ecosystem that empowers freshers to successfully transition into the professional world.

II. LITERATURE REVIEW AND OBJECTIVE

A. LITERATURE REVIEW

Recent advancements in recruitment technologies have spurred a significant interest in developing platforms that not only match candidates with job opportunities but also provide comprehensive assessment and training tools. Several studies have examined various aspects of job portal design and candidate evaluation. For example, research by Anderson et al. [1] explored the use of online aptitude tests to objectively measure candidate skills, highlighting their potential to reduce hiring biases. Meanwhile, Lee and Chen [2] investigated the integration of mock interview simulations within recruitment systems, demonstrating that such features can enhance candidate preparedness and

DOI: 10.48175/IJARSCT-26601

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confidence. In the context of web application architectures, Kumar et al. [3] emphasized the benefits of microservices-based designs for scalability and modularity, which are critical for handling diverse functionalities such as user management, assessment modules, and real-time data processing. Other related work by Patel and Gupta [4] focused on the user experience in digital recruitment platforms, advocating for interactive interfaces that engage candidates through modern frontend technologies. Despite these advancements, a gap remains in platforms that target freshers exclusively, where the emphasis on experiential learning and tailored assessments is paramount. The proposed system builds on these insights by integrating comprehensive aptitude testing and mock interviews, thereby addressing the unique challenges faced by entry-level candidates in the competitive job market.

B. OBJECTIVE

The primary objective of this study is to design and implement a job portal web application exclusively tailored for freshers. The system is developed with a robust microservices architecture using Spring Boot for the backend and leverages React and Three.js for a dynamic, interactive frontend. The key objectives of this project are as follows:

1. Create a recruitment ecosystem specifically for entrylevel candidates, addressing the challenges faced by freshers who often compete with more experienced professionals on generic job portals.
2. Integrate a comprehensive aptitude testing module that evaluates candidates' problem-solving skills, technical knowledge, and logical reasoning. This objective evaluation helps reduce hiring biases and provides a fair platform for all applicants.
3. Offer a free mock interview service that simulates real interview scenarios, allowing candidates to practice and receive feedback. This feature aims to boost confidence and prepare candidates for actual job interviews.

III. PROPOSED SYSTEM

A. SYSTEM ARCHITECTURE

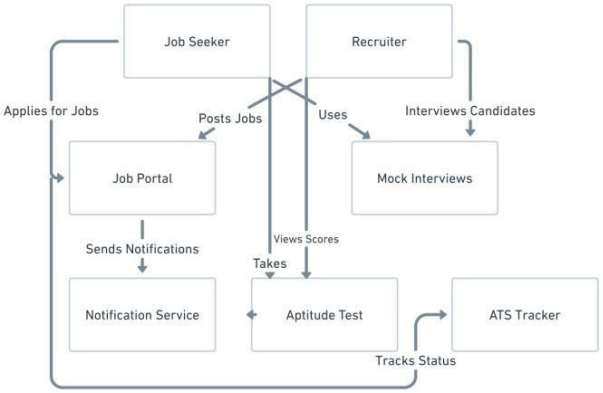

Fig (a). System Architecture

1. Job Seeker Registration: A candidate signs up on the Job Portal and creates a profile, enabling them to discover and apply for suitable job openings.
2. Aptitude Test: Upon deciding to evaluate their skills, the job seeker takes an aptitude test, and the system securely stores the results for recruiter review.
3. Notification Service: Real-time alerts inform both job seekers and recruiters about new job postings, test outcomes, or scheduled interviews, ensuring timely communication.
4. Mock Interviews: The recruiter utilizes a built-in module to conduct mock interviews, offering immediate feedback that helps candidates refine their performance.
5. ATS Tracker: An applicant tracking system continuously monitors the candidate's status in the hiring pipeline, enabling recruiters to manage multiple applications efficiently.

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6. Recruiter Actions: With clear insights from test scores and interview feedback, recruiters can shortlist candidates, schedule further interviews, or extend offers, creating a streamlined recruitment experience for all parties involved.

IV. IMPLEMENTATION

1. Backend Development with Spring Boot Microservices

a. Service Decomposition:

The backend is segmented into distinct microservices, each responsible for a specific functionality. These include:

- User Management Service: Handles registration, authentication, and profile updates.
- Job Management Service: Manages job postings, applications, and recruiter interactions.
- Aptitude Test Service: Administers aptitude tests, scores responses, and stores candidate results.
- Interview Service: Schedules and facilitates mock interviews, capturing feedback and performance metrics.
- Notification Service: Sends real-time alerts and notifications to both candidates and recruiters.

b. RESTful APIs and Communication:

Each microservice exposes RESTful APIs that allow them to communicate securely over HTTP. An API gateway is implemented to route requests, handle authentication, and manage cross-cutting concerns such as logging and error handling.

c. Containerization and Orchestration:

The microservices are containerized using Docker to ensure consistency across different environments. Kubernetes is employed for orchestration, providing capabilities for load balancing, auto-scaling, and self-healing, which enhances the system's reliability and scalability.

d. Data Management

A combination of relational databases for transactional data and NoSQL databases for unstructured or semi-structured data is used. This hybrid approach ensures efficient data storage and retrieval for user profiles, job listings, test scores, and interview records.

2. Frontend Development with React and Three.js

a. User Interface and Experience:

The frontend is built using React, enabling the creation of a responsive and modular interface. Key user interactions include:

- Registration and Login: Users can create an account, log in, and manage their profiles.
- Job Search and Application: Candidates can browse job listings, apply directly, and track application statuses.
- Aptitude Test Interface: Interactive test modules are designed to assess user skills, with real-time feedback and progress tracking.
- Mock Interview Module: Users can schedule and participate in simulated interviews, complete with a feedback section.

b. Enhanced Visuals with Three.js:

Three.js is integrated into the frontend to provide interactive 3D visualizations. For example, data dashboards may include 3D charts and timelines that present a more engaging way to view performance metrics and application progress.

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3. Integration and Continuous Deployment

a. Continuous Integration/Continuous Deployment (CI/CD):

A CI/CD pipeline is set up using tools like Jenkins or GitHub Actions to automate testing, building, and deployment. This ensures that any new feature or bug fix is thoroughly tested before being rolled out.

b. Monitoring and Logging:

Tools such as Prometheus for monitoring and ELK
(Elasticsearch, Logstash, Kibana) stack for logging are used. These tools help track system performance, log errors, and facilitate quick troubleshooting.

c. Security Measures:

Security is implemented at multiple layers:

• Authentication and Authorization: Secure authentication mechanisms like OAuth2 ensure that only authorized users can access specific services.
• Data Encryption: All sensitive data is encrypted during transmission and at rest.
• API Security: Rate limiting, input validation, and proper error handling are enforced to prevent common vulnerabilities such as SQL injection and cross-site scripting (XSS).

Key Achievements:

- Streamlined Recruitment Process: The system objectively evaluates candidates through integrated aptitude tests and mock interviews, reducing hiring biases and significantly speeding up the selection process.
- Scalable and Secure Architecture: Built using Spring Boot microservices and containerization with Docker and Kubernetes, the platform ensures high reliability, seamless scalability, and robust data security.
- Enhanced User Engagement: An interactive frontend leveraging React and Three.js creates an engaging user experience, resulting in higher user satisfaction and improved candidate-recruiter interactions.

V. CONCLUSION

This project introduces a specialized job portal tailored for fresh graduates, aiming to bridge the gap between academic preparation and industry expectations. By integrating features such as aptitude assessments and mock interviews, the platform not only facilitates job matching but also enhances candidate
readiness. The adoption of a microservices architecture using Spring Boot ensures scalability and maintainability, while the incorporation of modern web technologies like React and Three.js enriches the user experience. Looking ahead, the platform sets the stage for future enhancements, including AI-
driven job recommendations and advanced analytics, to further streamline the recruitment process for both job seekers and employers.

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