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Construction of a Smart Employment Platform for Vocational Undergraduate Colleges Based on Dynamic Interaction

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Abstract: This paper designs and implements a smart employment platform for vocational schools, focusing on solving problems such as information asymmetry and process breakpoints in multi-party collaboration. The platform adopts a B/S architecture, utilizing the Gin framework and GORM technology stack to build a microservice support layer, integrating core modules such as recruitment collaboration, full-cycle internship management, school-enterprise cooperation project tracking, and alumni resource activation. By reconstructing the service cycle of "data collection—real-time interaction—feedback optimization," it provides a replicable technical path for the digital transformation of vocational education.

Keywords: Vocational Undergraduate Education; Smart Employment; Dynamic Interaction; Gin Framework; Microservice Architecture

1. Introduction

The revised Vocational Education Law of 2022 explicitly stipulated the construction of an information platform for industry-education integration, marking the beginning of a new stage of legally-based development for vocational education informatization. However, a recent survey of employment services in vocational undergraduate colleges revealed that some structural contradictions remain prominent and have not been naturally resolved with the advancement of reforms. Firstly, there are information silos. Recruitment information, internship records, and alumni information related to student employment are often scattered across different information systems. Due to the lack of universal information exchange standards, information transmission is difficult when working across systems, hindering collaboration efficiency. During peak seasons, many companies have flexible staffing needs, but 40% of these needs are posted and closed within 72 hours. This means that the traditional process of initial resume screening and company interview arrangements takes at least 1-3 days, making it difficult to meet the needs of rapid matching and flexible use of employment information during peak seasons in the manufacturing industry. Secondly, there is a lack of advanced analysis. Employment analysis lacks advanced analytical support. Nearly 80% of schools still rely on tools like Excel for statistical analysis of employment data, requiring manual summarization and lacking in analytical capabilities. Even when analysis is available, monitoring and early warning are difficult, often resulting in employment guidance lagging behind the occurrence of problems.

To resolve this contradiction, the author attempts to propose a platform design based on the concept of "dynamic interaction," focusing on three aspects: a job acquisition mechanism oriented towards skills matching, which transforms enterprise needs into a computable skills graph; handling high-concurrency requests based on lightweight microservices; and dynamic allocation of multi-role permissions to support collaboration among students, enterprises, schools, and alumni throughout their career lifecycle.

2. System Architecture and Functional Design

2.1 Demand Characteristics Analysis

Vocational undergraduate education is closely aligned with industry needs, requiring information platforms to support the specific needs of four heterogeneous groups. Currently, recruitment platforms have issues with job applications; students applying for internships often find some positions unavailable on the platform or are unsure how to apply. Therefore,

the information platform includes a module showcasing an "application-review-result" tracking system, allowing applicants to monitor their application progress. In the enterprise talent search module, traditional job postings only provide textual descriptions, failing to accurately identify whether candidates meet the requirements. The platform adds a "skills requirements" field, enabling companies to search based on these requirements, improving information retrieval efficiency. Student employment analysis relying solely on statistical data such as employment rates is insufficient for university administrators' decision-making. The platform provides multi-module reports, automatically generated, including data on employment rates and geographical distribution, replacing manual statistics, addressing information asymmetry, and providing decision support. In the alumni knowledge module, the alumni knowledge network is defined by a dual-label model of "career field" and "participation" activities. This dynamic and evolving network reflects the accumulated professional gains and resources of alumni..

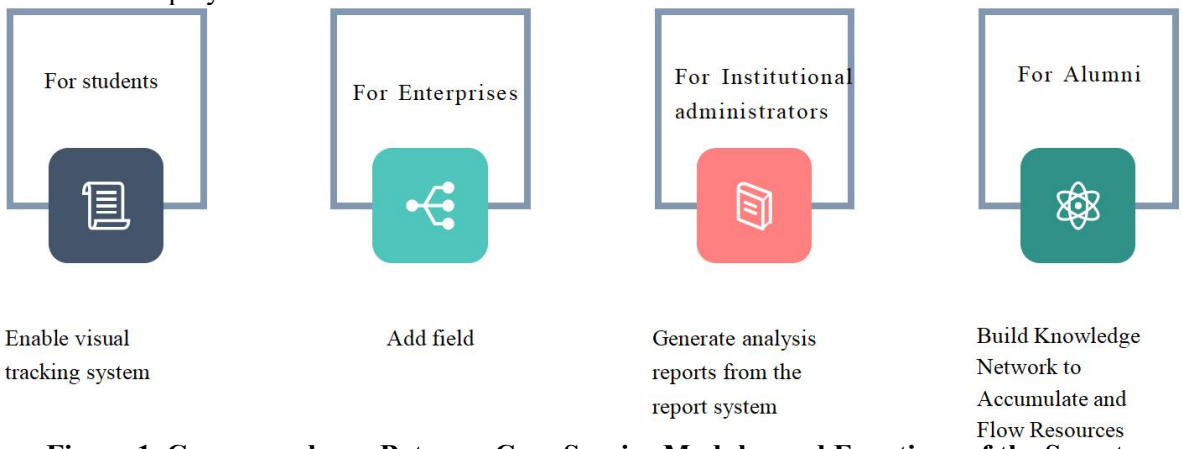

Figure 1. Correspondence Between Core Service Modules and Functions of the Smart Employment Platform

2.2 Functional Architecture and Implementation Logic

The functional design follows the principles of vocational education and teaching, and is dynamically adjusted to meet industry needs. In the school-enterprise cooperation module, the three statuses of "in progress/completed / tentative" match enterprise project management. The career planning module integrates "interest +- test +-", "personality +- test +-", and "ability +- diagnosis +-" to ensure that assessment results correspond to the competency models for each position. Access management does not have fixed roles but is dynamically managed through "authorization." As students approach graduation, job information and advanced screening buttons will automatically unlock. Initially, companies can only view selected resumes; in the intermediate stage, they can view all resumes and send interview invitations via in-app messages; later, they can send offer notifications. As permissions are gradually granted, the number of applicants increases. More importantly, dynamic authorization ensures security, and information flow and business rhythm are more closely linked—after a student submits an internship application, the partner company will immediately receive in-app messages and SMS reminders; modifications to alumni activity data will also be synchronously updated in the school-enterprise cooperation evaluation index.

3. Key Technology Implementation

3.1 High-Performance Architecture Design

To cope with peak traffic during the recruitment season, a layered defense was implemented at the architectural level. The presentation layer was redesigned with Bootstrap 5 for responsiveness, and the DataTables plugin enabled online recruitment information retrieval, allowing for fuzzy matching based on company name keywords and precise targeting based on skill keywords. The control layer, based on Gin routing, has been tested and can support over 210 requests per second. The recruitment information publishing API conforms to RESTful principles and supports POST data transmission in JSON format. System stability also depends on data layer optimization. By

configuring the Gorm connection pool, setting the maximum opened connections to 50 and the maximum idle connections to 10, and combining this with index tuning, the employment analysis module consistently maintains a return time of less than 1.4 seconds when performing page-based queries on thousands of data points. For computationally intensive scenarios such as report generation, the platform uses an asynchronous message queue mechanism for decoupling, mitigating the impact of traffic peaks on the main business and avoiding blockages through peak traffic smoothing. This layered defense design has ensured system stability and efficiency under high load in practice.

3.2 Dynamic Interaction Mechanism

The platform has made breakthroughs in visualizing university-enterprise collaboration. The project progress management module combines Gantt charts and state machines, using color coding to indicate different statuses , green for in progress, blue for completed, and red for paused, allowing all participants to clearly understand the project's progress. The system also includes built-in triggers based on status changes. When an internship application status changes to "pending review," the workflow engine automatically triggers and pushes the application to the enterprise. If the enterprise does not respond within 72 minutes, the system automatically switches to a manual channel and generates a corresponding service quality improvement work order. This ensures timely feedback and prevents delays from halting the entire process .

3.3 Security and Auditing

Due to the confidentiality and sensitivity of educational data, the system employs a defense-in-depth approach to ensure its security. User credentials are stored using the bcrypt algorithm with a fixed iteration count of 12 to resist brute-force and rainbow table attacks. For operational auditing, the system uses the ZAP log library to audit events such as user resume deletion and user role changes, recording logs including the operator, time, IP address, and snapshot, meeting the Level 2 security protection requirements for educational information systems. The system adopts role-based access control, ensuring that student users can only see their own resumes, and enterprise users can only see anonymized information about resumes they have viewed, satisfying the principles of user privacy protection and data minimization.

4.Empirical Analysis

4.1 Testing Environment and Methods

To verify the system's actual load-bearing capacity, we conducted system stress tests on real devices. The server used the same configuration as the production environment: dual Xeon E5-2670 v3 processors, 48GB of RAM, and 2TB SSDs. The client used devices that closely resembled real user experiences: a Core i7-14700 processor and 16GB of RAM. Apache JMeter was used for stress testing. The server-side stress test logic involved simultaneously performing operations such as posting job information, exporting large amounts of data reports, and multi-condition searches under 200-500 concurrent users . We also conducted a user experience test, selecting 126 teachers and students to participate. Using the TSUI task success metrics, we objectively evaluated the platform from the perspectives of ease of use and task completion, understanding the user experience and obstacles encountered during real-world use, beyond performance testing.

Table 1. Hardware Configuration Description of the Test Environment

Terminal type	processor	Memory	storage
server	Xeon E5-2670 V3	48GB	2TB SSD
Client	Core i7-14700	16 GB	256GB SSD

4.2 Performance Test Results

Stress testing verified the system's horizontal scalability. With 200 concurrent users, the average response time was 1.2 seconds, and the transaction success rate was 100%. At this time, the server load was balanced, and CPU utilization was 42%. With 500 concurrent users, the average response time was 2.1 seconds, and the transaction success ratewas 99.7%. The server load was 89%. No timeouts or degradation to a wired state occurred during the entire process . These tests demonstrate that the system has good horizontal scalability. The

system can meet the demand of approximately 200-500 requests during peak internship application periods . User and teacher feedback indicates that the visual progress display and mobile app compatibility significantly reduced the uncertainty of internship applications. Enterprise users reported that the structured skills screening reduced the initial resume screening time by approximately 40%, significantly improving efficiency and reducing the difficulty of manual screening.

4.3 Application Effectiveness and Deep Value

Over the course of six months, the platform has achieved significant results in several areas. According to feedback from enterprises, processing time has been reduced from 72 hours to 24 hours, an average reduction of 66.7%. The time for generating employment statistics reports through the platform has decreased from an average of 15.7 minutes to 2.8 minutes, an average reduction of 82.2%. Job matching through skill field comparison has increased the job suitability rate from 68% to 92%. Improved technical efficiency management is only one aspect; more importantly, it has improved the entire education ecosystem. Enterprise needs are more accurately described through structured fields. Schools have used the enterprise demand information in the system to identify three majors with employment rates below 60% for three consecutive years , and have initiated dynamic adjustments to these majors, optimizing the professional structure. Through the alumni resource database, the platform's operation has increased the number of resources by 210%. Through comparison and matching within the system, 4 horizontal cooperation projects have been facilitated in six months. The system's operation has not only increased alumni resources, but more importantly, through school-enterprise cooperation, it has gradually realized a development pattern where talent cultivation feeds back into industry.

5. Conclusion

The dynamic and interactive smart employment recommendation platform can alleviate the structural contradictions in employment services for vocational undergraduate colleges. Architecturally, lightweight microservices support high-concurrency scenarios; in application, it reconstructs the school-enterprise interaction process using skill-based data models and dynamic permissions.

However, it also has certain limitations. For example, the matching module mainly uses simple keyword matching, which does not provide enough support for implicit skills such as teamwork, resilience, and curiosity; and the decision-making module does not provide sufficient support because data such as social credit and industry salary standards from external companies are not yet integrated.

Two initiatives are planned for the future. On the one hand, natural language understanding technology will be used to automatically extract unstructured recruitment requirements, and then dynamically extract and infer skill maps. On the other hand, a blockchain-based mechanism will be used to establish an interactive evidence storage mechanism between universities and enterprises, forming an immutable internship evaluation and credit record, which will, to some extent, solve the current problems of "score boosting" and "internship boosting".

The digitalization of vocational education is not merely an accumulation of technological tools, but a systemic restructuring involving organizations, processes, and value networks. The platform model proposed in this article, and its relevance to other institutions, aims to demonstrate that only through meticulous data governance and real-time interaction mechanisms can industry-education integration move from a superficial initial step to deep integration .

Acknowledgments

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