# Research of Online Examination System based on JavaEE

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**Abstract.** By summarizing the drawbacks of traditional examination method,this paper analyzes the basic methods of online examination system,the basic principle involved,business process,business model,practical construction method,the SSH framework for the development of Web three layer structure model and MVC develop- ment mode based on system persistence layer.A realistic on line examination system has been implemented and in use．Experimental results show that,this system has obtained excellent performance results．

The traditional examination method should organize an examination, and it is necessary to go through artificial propositions, printed test papers, organization of candidates' examinations, manual examinations, summary of results, analysis of test papers, examinations, etc. This will not only waste a lot of manpower, financial resources and material resources, but also ensure All aspects can not go wrong, these are caused by the traditional workshop-style test [1 - 4].Under the strong support of the development of information technology, in order to resolve this contradiction, the online examination method based on Web technology has become the primary choice for reform of the current examination model.

This paper takes the development and implementation of online test management system as its theme, elaborates the basic theory and basic technology of online test system development, and develops and implements a web-based online test management system. The research of this paper is to deepen the reform of the test model. It is of great practical significance to strengthen the informatization construction of examination work management.

### On-line Examination   System Theory and Technology Basis

**The composition of the system.**The online examination system speaks from the function, mainly completes the online examination function based on Inter-net; From the system construction point of view, similar to the ordinary Web application management system, it is necessary to provide the Web service based on the HTTP protocol externally, and the internal specific business logic Handle the underlying data information; From the use of speaking, according to the function to process the user's request, and feedback the processing result to the user. The composition of the online examination system should include five parts, namely database server, Web server, background application server and network cascading device and terminal examination host.

**Web   Development   Technology.**(1)B/S   architecture   model.B/S   architecture[3-5],The Browser/Serve framework, which is an improved structure of C/S architecture with the rise of Internet technology. The B/S architecture has distributed characteristics, and it can perform business processing such as querying and browsing anywhere at any time. In the B/S architecture, the business expansion is simple and convenient, and the server function can be increased by adding web pages. The application system based on B/S framework is simple and convenient to maintain. It only needs to change the web page to achieve synchronous update of all users. Under the current mainstream program development language technology, the B/S architecture system development is simple, sharing and strong. Therefore, this paper designs the system as a Web-based online management system based on the JavaEE technology framework B/S structure.(2)Three-tier architecture and MVC development model.The system uses the MVC model to highlight the characteristics of multiple models that can share a model. This model separates data and business

rules from the presentation layer to maximize code reuse. At the same time, since the model is self-contained and separated from the controller and view, it is easy to change the application's data layer and business rules. With the MVC model, if the functionality of the model is correctly implemented, the view can display them correctly regardless of whether the system data is from a database or an LDAP server.The system uses the MVC model to ensure the independence of the three components in the developed application, is changing one of them will not affect the other two, thereby satisfying the need for loose coupling and high expandability of the system.(3)SSH open source framework development technology.SSH shows three frameworks in Java, namely Spring,Struts and Hibernate. Struts for Model, View and Control-ler provides corresponding components and is a concrete implementation of the MVC pattern. Spring is a lightweight Inversion of Control (IoC) and Aspect-Oriented (AOP) container framework created to solve the complexity of enterprise application development. Spring uses basic JavaBeans to do things that were previously only possible with EJBs. Hibernate is an open source object-relational mapping framework that encapsulates JDBC with very lightweight objects that can be used in any application JDBC occasions can be used in Servlet/JSP Web applications, but also in the application of EJB's Java EE instead of CMP, to complete the task of data persistence. The Web online test management system described in this article will also be developed using these three open source frameworks.

**The key Technology of System Design**

**Automatic rollout strategy.**To build an online test system, the key issue is the automatic generation of test papers. That is, a test paper that satisfies the test requirements is automatically generated in the test system. To solve this problem to do two things: one for the test database build; two for the design of the group strategy.

The construction of the test question bank is to classify and summarize the questions that need to be examined in the test, for example, according to the characteristic parameters such as the question type, degree of difficulty, knowledge point, estimated answer time, etc., so as to form targeted and professional comparatively strong Uniform examination question bank.

After the test question bank is built, some strategies and algorithms are organized to complete the automatic test paper assembly. In the on-line examination system described in this article, the strategy adopted by automatic testing is considered from the following aspects:

(1)Analyze the user's needs, ie the user's object, knowledge structure, examination intensity, and examination depth.

(2)The index of the volume of the conversion group, including the examination time, the difficulty system, the distribution of questions and the degree of differentiation of the questions, etc.

(3)The calculation method is based on the index of the group.

(4)Check the test questions to ensure that the test questions do not exceed the scope and capabilities of the test subject and optimize the test paper.

According to the above characteristics, the system adopts the strategy of group winding: First, quantify the user requirements; second, determine the index of the group; then build the algorithm model; Finally, select the questions and optimize the matching question bank to complete the group.

**Message queuing technology.**The online test system described in this article faces the biggest problem is that multiple clients simultaneously log in, answer at the same time, and issue at almost the same time. In particular, if a large number of large-scale exams are taken, the candidates will ask questions, do questions, save and submit, etc. The operation will frequently interact with the test database, making the concurrent access large and easy to access blocking, in order to solve the problem, the system introduces a message queue mechanism.

The system uses a central server. When it receives requests from multiple clients, if it cannot be processed within a short period of time, the test answer information will be queued first, and several control threads will be opened in the background of the system to process the message queue. Monitoring, if there is a message in the queue, the control thread asynchronously receives and processes the request message in the queue and performs operations such as message reply and data warehousing. If there is no message in the queue, the control thread keeps waiting.

## System Design and Implementation

**System Business Process Analysis.**The online examination system is mainly composed of candidates taking exams and teachers'management and operation and maintenance of examinations. It transforms the related processes, business interactions, and parameter configuration involved in online examination activities into a simple, visual, and convenient Web platform. The user roles of the system are divided into two categories. One is candidates and they mainly participate in and complete an examination. The other is teachers. The main function is to organize examination activities and manage the examination process and results.

**System Architecture Design.**According to system function analysis, process analysis and use case analysis, to realize the function of online examination is to combine the use case model to design the entire online exam business logic and process.

**System implementation.**After the system starts to run, you can access the system by entering the IP address where the web server resides in the test client. The test reports described in this article are all tested under the LAN environment. If you enter the candidate's username and password, select the candidate's role to log in to the main interface of the student exam management module.

If you enter the teacher's username and password, select the teacher role to log in to the main interface of the teacher management exam module.

**System performance test.**The system tests the internal logic and external functions of the system by means of unit testing, assembly testing and confirmatory testing.

System security check:

(1)Check the legality and consistency of the system administrator account and password;

(2)Check the number of characters filled in the system limit and determine the character type;

After testing, the system can respond normally and return correct results.

Performance evaluation:

(1)The joint use of navigation bar and function window makes the user interface friendly;

(2)Struts-based architecture, making the system has good scalability.

Security assessment:

(1)Set up a firewall to prevent illegal access by external users to ensure network security;

(2)Regular backup of data ensures data security;

(3)Preventing users from unauthorized access by ensuring rights management of users to ensure internal user access security;

(4)The database server IP address is invisible to the client, and special jobs can be routed or VPN connections.

## Summary

Based on the comprehensive study of the traditional examination model, this article uses the actual operation flow of the online examination as a model, elaborates the basic knowledge of the JavaEE-based online examination system, and thoroughly studies the technical conditions required for the development of the system, and finally designs and A JavaEE-based online examination system that meets the actual needs of online examinations is implemented.

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