

# Design of Online Examination System Based on SSH Framework

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**Abstract.** The examination is an important means to measure the ability of people, already deep into all aspects of society, but there are many malpractices in the form of traditional examination, so the online examination system studied in this research has certain practical significance. Firstly, studied the key technology of system design, namely SSH framework technology, including the research of Struts, Spring and Hibernate frameworks; then, using SSH framework designed the system architecture, and analyzed the overall structure of the system; finally, studied the specific function of system, the system is divided into six functional modules, including user login module, online examination module, system management module, exam management module, test paper management module, marking management module. The online examination system based on SSH framework has some flexibility, scalability and ease of maintenance, and promote the objectivity and impartiality of examination.

## Introduction

With the rapid development of network technology, educational information has become a development trend in the future, examination as the evaluation of the learning quality is undergoing the leap of paperless and network, from the traditional written examination to using computer and network-assisted examination, now has developed to Web-based technology online examination [1]. Essential meaning of the exam is to improve the quality of learning and to find the weak link of students and teachers, and then to comprehensively improve and enhance educational work. To achieve this purpose this paper using J2EE platform designed the online examination system based on SSH framework, online examination system can use the network to improve the efficiency, quality and equity of examination, is an extension of the traditional exam, increased the flexibility of exam meanwhile achieved multidisciplinary, multi-kinds of questions, and other functions, overcome many shortcomings of traditional examination, with objectivity and impartiality of the examination [2]. So content of this paper is important.

## SSH Framework Technology

J2EE is a server-side programming technology based on java language, J2EE platform is a multi-level distributed application model, has the following advantages, retains existing IT resources; has effective development; supports for heterogeneous environments; excellent flexibility and stable availability. Logic of the application on the platform according to its implementation of different functions are encapsulated into components, application components are installed to different machines in accordance with their respective layer, J2EE platform consists of client layer components, Web layer components, business logic layer components and business layer components, users interact with the database through a browser [3]. In which, Struts framework implements Web presentation layer, Spring framework achieves the business logic layer, SSH framework used in this paper is the effective integration of Web layer, business logic layer and persistence layer, fully played the characteristics of each frame, for the development and design of the system has certain advantages.

Online examination system designed in this paper is mainly based on SSH framework technology, SSH framework is integration of Struts framework, Spring framework and Hibernate frameworks, is a mainstream lightweight J2EE development framework, by integrating the

dependence among presentation layer, business logic and data layers, and then expand their common function, SSH framework has clear structure and is conducive to reduce the underlying workload for developer [4]. In which, Struts framework is responsible for request, transponder and others for page in presentation layer, Spring framework manages business logic in business logic layer, and Hibernate frameworks is responsible for interacting with the DB in the persistence layer. Using SSH framework to develop system has the following advantages, (1) take advantage of the components, reducing the amount of coding; (2) improve the hierarchy and cohesion of the system; (3) the reference provided framework help to better grasp development method and to shorten the development cycle; (4) the framework codes are refined and robust, and helps to reduce errors and debugging, tests workload for program. Its frame structure is shown in Fig. 1.

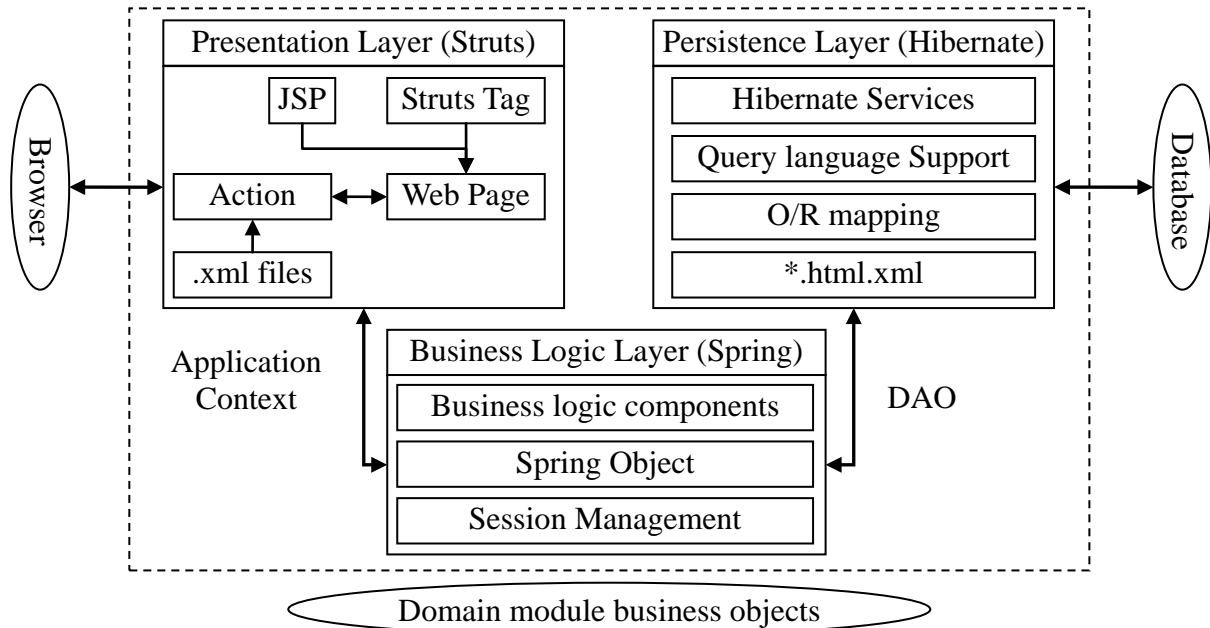


Fig. 1. SSH framework structure

### System Architecture Design

According to the actual demand, the design of online examination platform should adhere to the following principles [5]: (1) user-oriented principle, namely the system should have the operability and maintainability for the students as well as teachers and other users; (2) uniform principles, including unified standards and resources, up to share information and avoid duplication of operation, synchronized the database of exam-platform and management centre; (3) usability principles; (4) the principle of efficiency, mainly for system management, using minimal resources and the costs and time costs; (5) the principle of standard, abide by the correlation of modular structure, standard data formats, software, standard document formats and others unity; (6) the principle of stability, with stable, mature technology and software to ensure the platform system reliability. Combining SSH framework technology, the overall framework is divided into three levels, namely, the user layer, Web server layer and database layer. Architecture design structure of online examination system is shown in Fig. 2.

By analysing the online examination system framework, each layer has different functions, in the user layer, candidates, teachers and administrators through IE, Opera, Firefox, Google and other browsers to log on to the Web server; Web server layer provides the online examination, user login, question management, exam management, system management, marking management six functional module, enter system firstly need to identity authentication information, depending on the identity information may be using different functions provided by the system, for candidates concerned, candidates can enter the online exam module; teachers is mainly for marking, scoring, etc., and administrators carry on security settings, system administration and maintenance; database

layer is mainly used to store test paper information, test results, the user information, and other system information. Entire online examination system based on SSH framework achieved the integration of presentation layer (Struts), business logic (Spring) and data persistence layer (Hibernate), take advantage of MVC pattern offered Struts2 framework, making each layers structure clear, each other interconnected by a simple structure, solved the problem of decoupling, but also provides a convenient for the rapid development of the corresponding code, eventually the system has better maintainability and scalability [6].

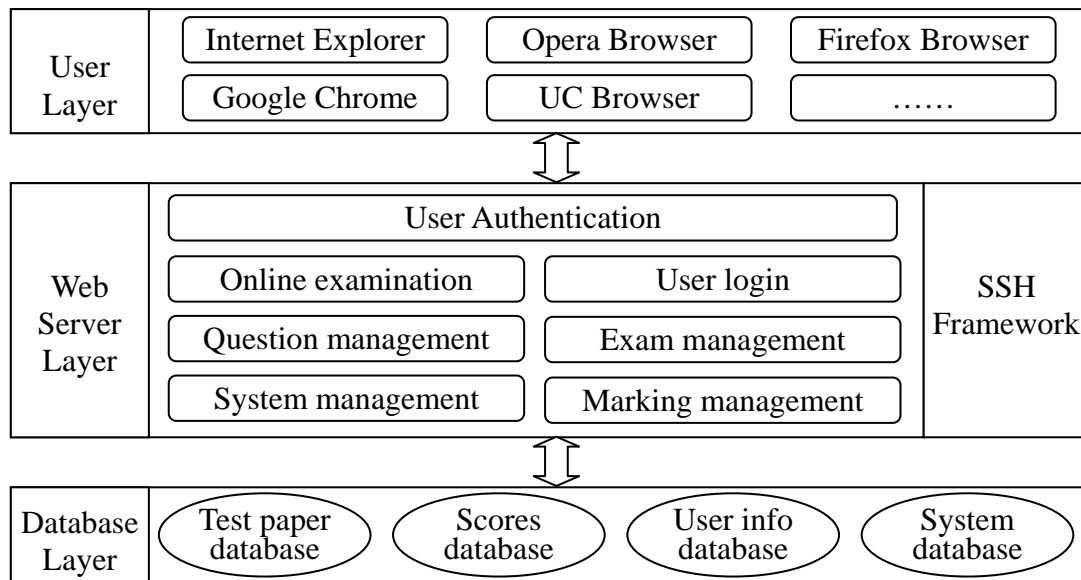


Fig. 2. Online examination system

### System Functional Design

Currently, online exam system is mainly for computer subjects examination system, really flexible for a variety of subjects were well-managed test system is very small, so need to develop a scalable, secure, reliable, efficient online exam systems to reduce the workload of teachers and to improve efficiency, meanwhile improve the quality of the exam, make exam tend to be more notary, more objective, and even more stimulate students' interest in learning [7]. According to the overall system architecture designed the function modules of online examination system, the system is divided into six modules, namely user login module, online examination module, exam management module, system management module, question management module, marking management module. Among them, the online examination module, the system management module is the core function modules of the system.

User login module includes foreground login and background login two modules, foreground login module is mainly used for the candidates login, background login module is mainly used for system administrators and teachers to log; online examination module includes exam login, distribute papers, exam time detection, answer real-time storage, query results and other functions; exam management module includes group volume management, test process management and others; system management includes test subjects management, user information management (user management, rights management, role management), department management, data backup, data recovery, security settings, and other functions; question management module includes questions adding, questions browsing, deleting questions, questions update and other functions; marking management module includes papers grading, score displaying and others.

Candidates by logging into the online exam module, click the start button to enter the exam state, show test time by reading the type of papers, can also online answer, answered a question by clicking on the next button to proceed to the next question to answer, at the end of the time will automatically pop up dialog box displays the answer ended, and then submit the papers; exam

management module contains group volume management, in the process of group volume management, teachers can select manual group volume and random group volume, manual group volume carry on group volume by the way of manually checking, need to input the name, belonging subject, the topic scores, random group volume is automatically generating test paper by inputting questions name, belonging subject and other associated information, using the random algorithm according to constraints [8]; in the systems management, security settings mainly conducts security control for system resources file, and guarantees system security; test paper management mainly add, delete, update and other operations for test paper information, when adding the test paper should note the inputting of test paper name and examination time; examination process management mainly refer to anomalies appeared on the exam, in case of generating failure to take effective measures; marking management module mainly mark the test papers by taking manually marking and automatic computer marking, manual marking mainly for subjective questions, but objective questions need to automatic marking.

## Conclusion

Online examination system based on SSH framework designed in this paper, which is divided into six major modules from function, where each module also contains many sub-functions, achieved comprehensive function, user-friendly, easy to operate, reduced the school investment in aspects of manpower, material and others and saved the exam cost, provides students with an independent, personalized, fairness examination platform. Compared with the traditional examination, online examination system increased the flexibility of the examination, reduced the workload of teachers, improved work efficiency, significantly improved the effectiveness, reliability of examination, further ensured the fairness and objectivity of examination, and had a significance for promoting educational information [9].

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