Development and Application of Calligraphy Culture Communication Platform Based on Web Technology

Wenbin Yang(✉)

Hulunbuir University, Hailar, Inner Mongolia, China
ywb@dlvtc.edu.cn

Abstract. Based on Web technology, we developed a calligraphy culture network communication platform under the framework of Flask and Python language. The platform can innovatively integrate network information technology into the spread of calligraphy culture, and realize the networked and digital service of calligraphy art and Chinese character culture. By supporting online sharing, online communication, online courses, online exhibitions and other functions, the calligraphy network communication platform emphasizes the sharing and communication of the audience more than the traditional unitary and propagandistic communication mode, which solves the dilemma of calligraphy culture communication in the current network era and can better provide users with a good artistic experience. The network communication platform of calligraphy culture can not only meet people's growing needs of material culture and spiritual culture, but also show calligraphy Chinese character culture to the public in a brand-new way, which is an important measure to actively establish national cultural self-confidence.

Keywords: Web Technology · Python · Calligraphy Culture · Network Communication Platform

1 Introduction

"Chinese characters are supposed to record language and convey ideas, and their main function is practicality. What's different is that the writing of Chinese characters gives rise to extremely high aesthetic value. Since the Han Dynasty, there have been a lot of literature to discuss this issue. Historically, Chinese character writing activities were called 'books', and those books with normative and aesthetic value were called 'calligraphy'. Now, we habitually refer to Chinese character writing activities and their outstanding achievements in history as 'calligraphy' in general. Because of the introduction of western artistic concepts, Chinese calligraphy is always in the name of art" [2]. As the carrier of language, Chinese characters have a long history and a long history, which is unique in the world writing system with its unique composition. With the simplification and abstraction of Chinese characters from pictograph to ideograph, calligraphy, which relies on Chinese characters, uses pen and ink as the expression technique to express emotions, has experienced five gorgeous transformations of seal script, official script, cursive

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script and regular script. “Chinese calligraphy, as an integral part of Chinese culture and a subsystem of the Chinese cultural system, has a multi-dimensional and multi-level cultural character, which is inherent and innate in Chinese calligraphy. This character and nature are closely related to all aspects of Chinese traditional culture, both explicitly and implicitly, showing its various cultural functions and cultural values.” [3].

The origin of Chinese characters is to spread information more accurately. Writing in different periods uses different carriers because of different functions. Most of the inscriptions show official solemnity, and bamboo slips and paper and silks are convenient for communication and communication outside formal writing. Information dissemination with gold, stone, bamboo slips, bamboo slips, silk and paper as the media also regulates people’s writing intentionally or unintentionally when conveying relevant information. Admittedly, the media in different periods are influenced by the development level of science and technology. In the Internet age, human communication is accelerating, and diversified media have penetrated into people’s lives, effectively expanding the channels of Chinese calligraphy communication again, and meeting the needs of the audience to contact, understand and obtain calligraphy-related information. In the multimedia era, the original communication mode is far from meeting people’s demands for learning traditional calligraphy culture. Therefore, this paper holds that it is one of the effective means for us to solve this problem to build a calligraphy culture network communication platform based on Web technology and Python language, and strive to focus on calligraphy culture communication, supplemented by diversified communication modes such as calligraphy education, calligraphy exchange and sharing, and calligraphy online exhibition.

2 Key Technology Introduction

2.1 Page Setup

Web is a network service based on the Internet, which provides users with the required operation interface. The core component of Web is Web pages, which are divided into static and dynamic. Static web pages are presented in the form of text, pictures, videos, audio, etc., while dynamic web pages can automatically generate new pages, which is convenient for users to call other web applications through web pages [4]. As far as practical applications are concerned, most of them are web pages that combine dynamic and static.

The development of Web depends on the corresponding technical support. On the whole, Web applications are divided into three parts: client browser, server-side business logic processing Web server and subsequent data storage database server. The corresponding Web technologies are also divided into client-side development technology, server-side programming technology and database development technology, as shown in Fig. 1. Among them, the client development technology needs to use HTML, CSS and JavaScript to complete the design and development of web pages with the corresponding framework. In the server-side technology, relying on powerful object-oriented programming languages such as Java, PHP and C# and the combination of various development frameworks (J2EE and ThinkPHP) can greatly simplify the development process of the

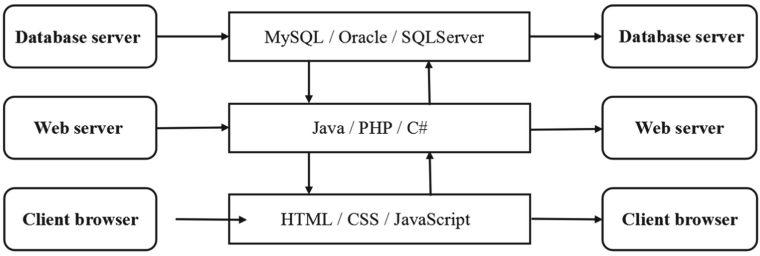

Fig. 1. Web development technology structure diagram

server-side. However, data development technology needs the cooperation of database servers, among which MySQL, Oracle, SQLServer and so on are common data servers.

The structure and specific processing process of the whole Web application adopt the "request/response" mode, that is, the user sends a request to the server through the client browser, and the server controls and processes the service in time after obtaining the request, completes the request response, and feeds back the corresponding result to the client.

2.2 Python

Python is a high-level scripting language that combines interpretability, compilation, interactivity and object-oriented. Python language originated from C language, and followed most grammar habits of C language. Python language has class, function, exception, core data types including list and dictionary, and extended system based on module [5]. The original intention of Python language design is to be concise and clear, to enhance the readability of code, and to facilitate users to learn and master quickly. Compared with other programming languages, Python's interpretive expression eliminates the compilation of code in the whole development process, and its usage is similar to PHP language. And its interactivity is a language that can support users to input execution codes from terminals and obtain results, and interactive testing and debugging code fragments. In addition, with its open source nature, Python can be widely transplanted and applied to Linux, Windows, MacOS, Andorid, IOS and other platforms.

2.3 Flask

Flask is a lightweight Web development framework based on Python and relying on Jinja2 template engine and Werkzeug toolbox. Flask itself is equivalent to a Web container, and other functions need to be extended by a third party. Compared with other development frameworks, Flask is more flexible, light, safe and easy to use.

The core part of the Flask framework consists of two core function libraries, Werkzeug and Jinja2. Werkzeug is used to receive and preprocess the Http requests from users. After triggering the Flask framework, the system processes the user requests accordingly based on the extended functions under the Flask framework, and returns the data results to users. The overall process is shown in Fig. 2. If the returned result

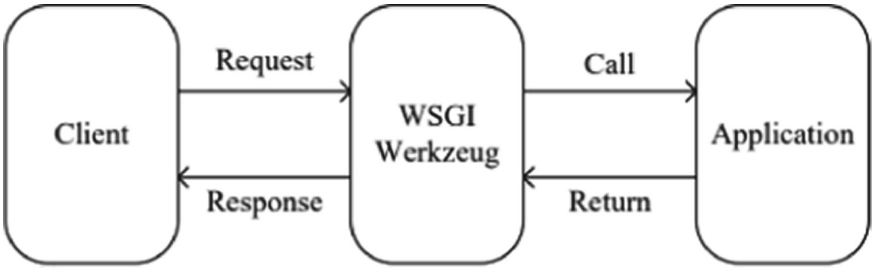

Fig. 2. Flask framework work flow chart

is complex, the jinja2 template engine is needed to control and render the template to improve the execution efficiency.

The Flask framework itself does not limit the choice of database, and developers can choose relational database (SQL) or non-relational database (NoSQL) by themselves. In addition, there is a more convenient data manipulation plug-in SQLALchemy under the Flask framework, which can facilitate developers to directly manipulate the database through Python objects, greatly improving the development efficiency of Web applications.

2.4 Development Environment

The system development requirements and the use requirements of the above key technologies determine the completion of the configuration and deployment of the development environment. The overall development of the system is based on Linux operating system, and the version is CentOS release. The Web server chooses Nginx server as the middle layer of the underlying data and external services, which can complete static files and handle business logic requests with its powerful functions and performance, and at the same time can realize the functions of load balancing, buffering requests and responding. The database server chooses MySQL5.7 to complete the system database construction and support. Python 3.6 is chosen as the project development language, and an independent development environment is created by installing virtual machine Virtualenv. Complete the installation and layout of Flask under the virtual development environment, as well as the installation of related components such as Jinja2, Werkzeug, Gevent, etc. During the operation of the Flask framework, it is necessary to follow the WSGI protocol, which is an interface specification between WSGI Server and WSGI Application only applicable to Python language. WSGI Server adopts WSGI communication protocol between uWSGI server and Flask and implementation to ensure the transmission of user requests and response results. During the overall operation of the system, uWSGI server and Nginx server jointly respond to user requests, as shown in Fig. 3, thus increasing the concurrency of the overall system application and improving the overall performance of the system.

Through the introduction of the above key technology theories, we have determined the overall environment of system development, the configuration of related software and tools, and the technical feasibility of the overall project of calligraphy culture network communication platform based on Web technology.

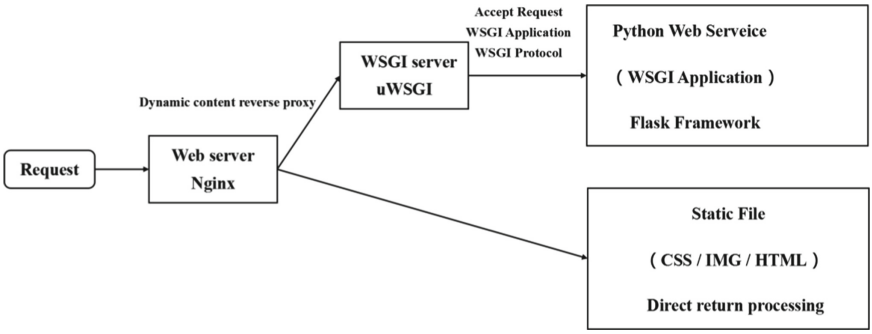

Fig. 3. The overall operation process of the system

3 Requirement Analysis

3.1 Functional Requirement Analysis

The network communication platform of calligraphy culture based on Web technology is a new form of calligraphy culture communication in the current "internet plus" era. Relying on network information technology, the traditional calligraphy art is transformed into intelligent, digital and virtual, which not only continues the information technology gene for excellent calligraphy culture, but also opens up a broader space for the spread of calligraphy culture.

Under the network communication platform of calligraphy culture, corresponding permissions are set according to different users' needs, which can be divided into ordinary users and administrators. At the ordinary user end, the system is equipped with functional modules such as online sharing, online communication, online courses, online exhibitions, etc. Compared with other communication modes, the difference lies in avoiding the traditional singleness, paying attention to the sharing and communication of the audience, thus forming the interaction and mutual assistance among groups. The online sharing function highlights the participants' purpose of "learning books for fun" and "adapting books to their own needs". Users don't have to stick to the integrity of their works, but they can try new ideas boldly, or they can upload daily lessons or daily exercises in time to get the approval or criticism of the viewers. The online communication function can better initiate interaction, and the communicators can speak freely and express different voices without being restricted by their identities, thus avoiding the embarrassment of staring at each other offline, and also avoiding the extreme adherence to the rigid experience that has been formed due to their different learning time, background, education background and so on. Online courses organically integrate the spread of calligraphy culture and calligraphy education, so as to make one's own understanding more comprehensive. The online exhibition function can meet the needs of the popularization of calligraphy culture. It can not only browse famous works, but also collect and display your own works, and also strengthen the communication between users. Let the main body of communication, the main body of audience and the media of calligraphy art develop towards popularization, which has changed the beauty of traditional calligraphy and replaced it with the support and participation of netizens [6]. The

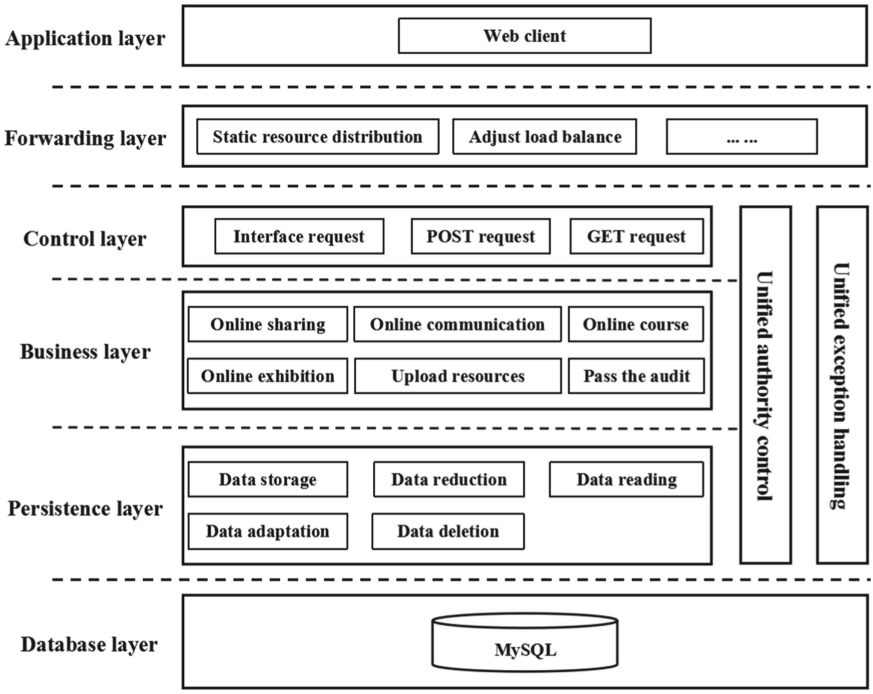

Fig. 4. Architecture diagram of the overall system operation process

main responsibility of the administrator end is to audit the data of new users; control the quality of shared content and text content to prevent the spread of inappropriate speech and unhealthy thoughts; update and maintain online teaching materials; timely overhaul and maintain the system to ensure its smooth and smooth operation.

3.2 Global Design

In view of the function setting of calligraphy culture network communication platform, combined with the application and configuration of related technologies mentioned above, we have completed the overall design of the system. The overall design of the system takes Web technology as the core, and uses B/S architecture to design the logical architecture of the system in layers, to define the functional division of each part and the coordinated operation among all levels. As shown in Fig. 4, the overall logical architecture of the system is divided into application layer, forwarding layer, control layer, business layer, persistence layer and database layer. The application layer is a functional page for users to complete login and interactive operation of the system. In the forwarding layer, the Web server Nginx completes the concurrency control and load balancing of the system. The control layer, business layer and persistence layer are completed by uWSGI server and Flask framework. The last database layer is supported by MySQL.

4 Function Implementation

4.1 Ordinary User End

On the interface of calligraphy culture network communication platform, ordinary users who log in for the first time need to complete the detailed information of user account according to the registration guide. Ordinary user interface is presented in the form of webpage, and ordinary users can log in through different devices or terminals, thus avoiding the limitation of time and space.

4.1.1 Online Sharing

Under the online sharing module, the writer can upload his/her homework through the mobile phone client or the computer webpage at the first time, without being limited by time and space. The forms of books encourage diversification, which can be banners, screens, letters, scrolls, fans, etc. They can also be printed screens, or exercises that have not been signed and printed. There are no restrictions on calligraphy styles, including regular script, official script, seal script, cursive script, running script, miscellaneous script and flower script. The content should be healthy and positive, which can be ancient classic poems, chapters, self-written poems, couplets, prose essays, self-study books and so on. There is no restriction on paper and ink, such as colored paper, hemp paper, color propaganda, white propaganda and color ink. The uploader can interpret the uploaded works in the form of words at the bottom of the picture, and the viewer can also express the corresponding opinions in the comments at the bottom of the works. The application of this function effectively improves the writing enthusiasm of writers, makes the spread of calligraphy culture more popular, and makes the audience more popular.

4.1.2 Online Communication

Ordinary users can initiate or participate in any topic under discussion. The system provides forum-style open chat rooms, and the chat content is open to everyone. The audience of chat room is diverse, and both calligraphers and novices can participate in it to clarify their position on a certain point of view. The strong atmosphere shows the charm of online calligraphy forum, a new way of communication in the era of calligraphy network, and indirectly forms a small-scale calligraphy network gathering and becomes an art salon for contemporary calligraphers [6]. The interaction brought by the communication between users to the spread of calligraphy culture is incomparable in the traditional way of spreading calligraphy culture. The efficiency and convenience of online communication on the Internet greatly enhance the effect of calligraphy spreading.

4.1.3 Online Course

Online courses effectively avoid the influence of time, space and money on traditional offline classroom teaching, and learners can log in and study at any time and place. There are various forms of learning contents, and theoretical courses include ancient Chinese calligraphy history, modern Chinese calligraphy history, ancient Chinese calligraphy theory, ancient Chinese calligraphy criticism and other theoretical courses. Skills courses

include regular script skills, official script skills, running script skills, cursive script skills and so on. In addition, the system will also provide content related to calligraphy culture, such as documentary films "Five Thousand Years of Chinese Characters", "Millennium Calligraphy", "Five Thousand Years of Chinese Calligraphy" and movies "Qi Gong" and "Master Hongyi". There are also excellent audio materials such as "The World of Fu Shan" and "Learning how to learn books". In addition, the high-definition pictures of famous authentic works are also the best choice for learners. Through the teaching of online courses and the careful exploration of original works in high definition, it provides an opportunity for learners to better understand Chinese traditional calligraphy art.

4.1.4 Online Exhibition

Writers can apply to the administrator end for holding individual or group online exhibitions according to their own needs, and the administrator end will help them hold individual or group exhibitions on the premise of strictly controlling the content of their works. The administrator end can also hold a certain type of exhibition according to a certain social activity, a certain book phenomenon and a certain theme, and take the form of public solicitation, with the right to relax the size and style of the works appropriately. Participants can hand in the pictures of the works in advance according to the deadline for solicitation, and the administrator end can hire reviewers with certain qualifications to participate in the evaluation, or vote to select the most popular works, and finally present them in the form of exhibitions. The online exhibition function can stimulate calligraphy lovers' motivation to learn and create calligraphy art, encourage calligraphy lovers to constantly challenge themselves and improve the level of calligraphy writing and artistic creation. At the same time, it can further expand the audience of calligraphy culture in competitions and exhibitions, highlight the charm of calligraphy art, and create the value of calligraphy art of the times [1].

4.2 Administrator End

On the administrator end, administrator users also need to register their accounts and log in. Compared with various application functions of ordinary users end, the administrator end pays more attention to the overall management and process supervision of the calligraphy culture network communication platform. The administrator is responsible for strictly controlling the uploading of works by ordinary users, making comments, submitting entries, etc., so as to ensure the smooth progress of each process and deal with emergencies in a timely manner.

5 Conclusions

The network communication platform of calligraphy culture based on Web technology can deal with the problems existing in the current communication of calligraphy culture to a certain extent. It integrates the network information technology into the calligraphy communication mode, effectively realizing the transformation from the traditional unitary and propaganda communication mode to digitalization, virtualization

and networking. At the same time, it combines the functions of sharing, communication, education, exhibition and so on, broadens the artistic vision of more inheritors of calligraphy art, expands the scope of communication, improves the communication efficiency and effect of calligraphy culture to a certain extent, and provides a good reference for the inheritance and development of China's excellent traditional culture in the current era.

Acknowledgements. If any, should be placed before the references section without numbering.

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