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Retraction

Retracted: Construction of Live Broadcast Training Platform Based on "Cloud Computing" and "Big Data" and "Wireless Communication Technology"

Wireless Communications and Mobile Computing

This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] Z. Sun and X. Li, "Construction of Live Broadcast Training Platform Based on "Cloud Computing" and "Big Data" and "Wireless Communication Technology"," *Wireless Communications and Mobile Computing*, vol. 2021, Article ID 8971195, 9 pages, 2021.

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Research Article

Construction of Live Broadcast Training Platform Based on "Cloud Computing" and "Big Data" and "Wireless Communication Technology"

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With the rapid development of information technology, a scientific theory is brought by the rapid progress of science and technology. The advancement of science and technology of the impact on every field, changing the mode of transmission of information, the advent of big data for promotion and dissemination of resources played their part, let more and more people benefit. In the context of cloud computing, big data ushered in another upsurge of development and growth. Given this, the live broadcast training platform, which focuses on enterprise staff training and network education, arises at the right moment. People favor its convenience, real-time performance, and high efficiency. However, the low-value density of big data and cloud computing's security problem has difficulties constructing a live broadcast training platform. In this paper, the live broadcast training platform's structure is improved by constructing three modules: the live training module based on cloud computing, the user recommendation module based on big data, and the security policy guarantee module. In addition, to ensure that the trainees can receive training anytime and anywhere, this paper uses wireless communication technology to ensure the quality and speed of all users' live video sources.

1. Introduction

In 2020, affected by the COVID-19, people have to shift their working mode from the company to their home. Powerful live broadcast training platforms will take this opportunity to stand out. The live broadcast training platforms represented by education and staff training will develop particularly rapidly. At present, although the COVID-19 situation has been stabilized, the way of webcast training makes people see its convenience. The webcast training will become the future development trend of education departments and significant enterprises.

The recent development in information technology, such as big data, cloud computing, and communication technologies, plays a vital role in making the world brighter [1–3]. With these intelligent technologies' immense power, we can connect, generate, retrieve, and process data anytime and anywhere. Meanwhile, we can also share data in real-time through the network broadcast.

The cloud computing paradigm has been designed for solving storage capacity and related computational issues. It enables high-performance computation with secure and robust storage capability [4, 5]. In modern computing paradigms, a massive amount of data is stored and processed at various clouds rather than the centralized cloud. Thus, all data requests coming from multiple sources have been directly transmitted to the centralized cloud. Therefore, large increments have been seen in the processing speed as compared to network bandwidth. Consequently, this provides a strong guarantee for the stability and fluency of network broadcast.

In Figure 1, network big data refers to the massive data generated by interaction and fusion of the ternary human-machine-thing universe in Cyberspace and available on the Internet. As a data technology developed under the Internet environment, big data has many prominent characteristics such as large data volume, multiple data types, low-value density, and fast processing speed. The online training
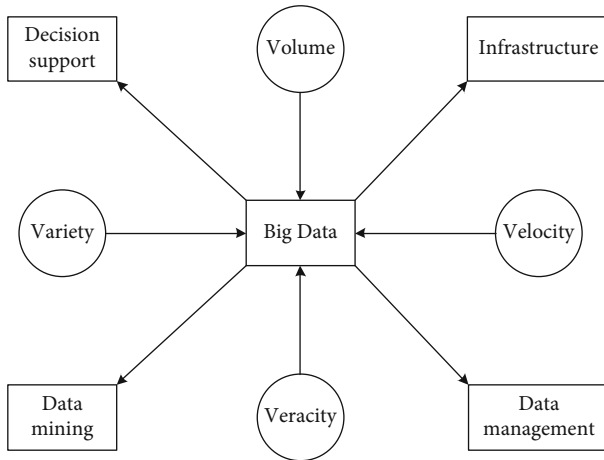
Figure 1: Big data features.

platform can realize a reasonable allocation of resources and more targeted training content based on big data.

At present, there are much researches on cloud computing and big data. Cloud computing is widely used in e-commerce, enterprise management, and information security. Explicitly speaking, cloud computing can provide information sharing and business collaboration for e-commerce [6], reduce the operating costs for enterprises [7], and ensure the security of data transmission and data storage [8]. Moreover, big data is mainly used in business, finance, healthcare, and manufacturing. Business is the most extensive application field for big data. Merchants can understand customers' shopping habits and create value by analyzing the unstructured data of consumers' shopping behavior [9]. In the financial field, consumers' credit scores can be obtained to infer customers' payment intentions and ability and to discover potential frauds through big data [10]. In the manufacturing industry, enterprises need to dig out the required information from the stored mass of information to promote decision-making and avoid risks [11]. However, at present, there are relatively few applications of big data and cloud computing on live broadcast platforms.

To sum up, it can be seen that the use of big data technology can systematically establish a live broadcast training platform and make full use of big Internet data to train trainees. However, big data's low-value density disadvantage requires cloud computing to make up through deep data mining. Besides, cloud computing's security problem will also make big data face the risk of leakage in the cloud environment. In this paper, cloud computing is used to deep excavate big data. The extensive data recommendation system is used to improve the precise positioning of live training. A security assurance strategy is used to enhance big data of the activity in the cloud environment. Consequently, the impeccable live broadcast training platform is founded.

2. Overall Framework Design of the Live Broadcast Training Platform

As is shown in Figure 2, the live broadcast training platform comprises three modules: the live training module based on

cloud computing, the user recommendation module based on big data, and the security policy guarantee module.

The functions such as authority authentication, platform data management, live broadcast content management, and user management need to be realized in the live training module.

The user recommendation module mainly includes the user characteristic data generation module, information matching module, and recommendation module.

In the security policy guarantee module, data storage security, user identity authentication, authentication of access, protection of data privacy, and construction of virtual security need to be realized.

3. Design of the Live Training Module

3.1. Authority Authentication. This section realizes the authority authentication for users of the background management system of the live broadcast training platform and prevent illegal user to call the system interface behavior. It is mainly composed of three functions: system administrator authentication, institution administrator authentication, and anchor authentication are shown in Figure 3.

3.1.1. System Administrator Authentication. The key to this step is the identity token recognition and the timing of authority authentication. The token has six categories:

(1) AuthController is the control class for permission authentication. When a system user logs in, the AuthController will invoke concrete methods to verify the user's identity. Then, the role encapsulates the user's identity information as an identity plate and returns it to the user. The identifying label is used as the user's passport to the system

(2) SysUserService is the service class that the system user operates. It can interact with the database through different requests sent by the front end and includes query system user, update system user information, login verification, and other methods

(3) CusPdncipalService is the service class that the system consumer operates on. After the management end of the system login user, the vital information such as username and password will be separately encapsulated as CusPrincipalEntity entity

(4) CusHostService is the service class of anchor information operation. After receiving the front-end request, the permission authentication control class can complete the anchor's process through this interface. It includes adding anchor, inquiring anchor information, updating anchor information, and other methods

(5) AuthenticationManager is the interface provided to validate user information in Spring Security. In this system, judging the user's identity and matching the user's password are mainly accomplished through the instance of this interface
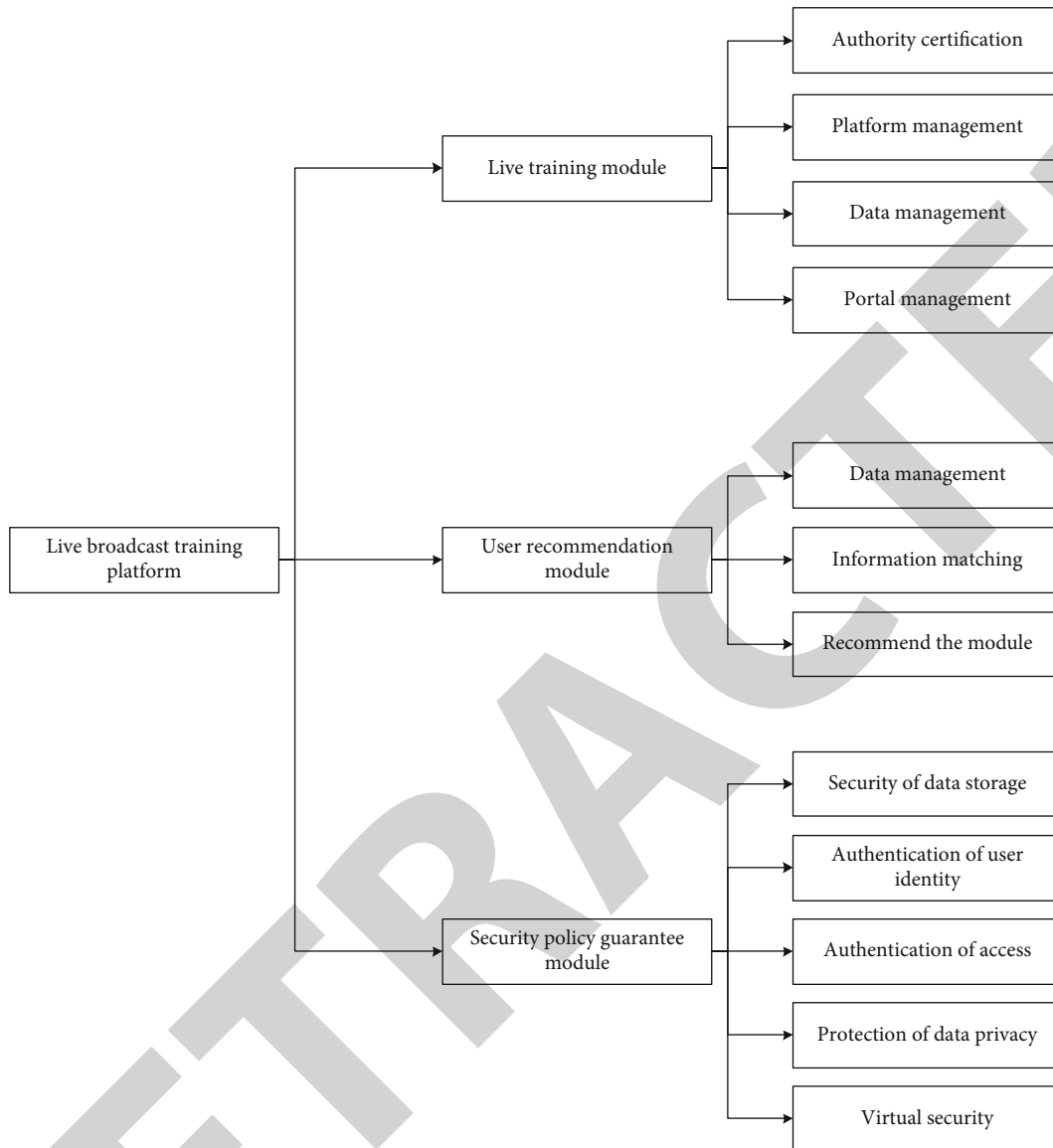
Figure 2: Overall framework design of the live broadcast training platform.

(6) JwtTokenUtil is mainly used to generate identity for the system users through the user's information. This identity plate is included in every request after the administrator or anchor successfully logs into the live training platform's background management system

The timing diagram of system administrator authority authentication is shown in Figure 4.

3.1.2. Institution Administrator Authentication. When the system administrator logs into the background management system of the live training platform, it can call the login method of or user service and reach the authenticate method of AuthenticationManager to validate the user's input information. After verification, the security context is established, and the user role is obtained to encapsulate its permission information. Consequently, the generated token method of

the jwtTokenUtils will generate the token and return it to the user.

3.1.3. Anchor Authentication. When the anchor logs into the live training platform's background management system, it can call the login method of HostService. Then, it calls the authenticate method of AuthenticationManager to validate the input information of the user. After verification, the security context is established, and the user role is obtained to encapsulate its permission information. Consequently, the generated token method of thejwtTokenUtils will generate the token and return it to the user.

3.2. Platform Data Management. The main data management module of the live training platform is mainly for the system administrators to manage all the administrators of the live broadcast platform and the anchors of the
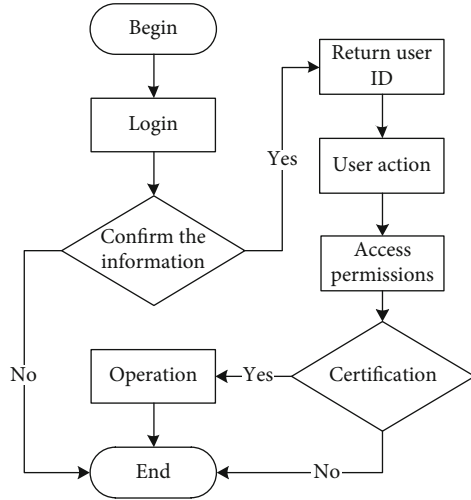
Figure 3: Flowchart of authority certification.

organization. The class diagram of broadcast room management is shown in Figure 5.

LiveRoomController is the control class of broadcast room management. It is mainly used to create a broadcast room and accept front-end requests and data. The creatLiveRoom method is primarily used to create a broadcast room through the broadcast room information's front-end submission.

LiveRoomService is the service class of broadcast room management. CreateLiveRoom, update, delete, and delete batch are used to create, update, delete, and batch remove the broadcast room.

LiveAdPageService is a service class that sets the guide page of the live room. The queryObject method is used to query the guide page information; the queryByLiveRoomId method is used to find the guide page by the ID of the live room, the queryList method is used to obtain the list of guide pages, save is used to add the guide page, update is used to modify the attributes of the guide page, and delete is used to delete the guide page.

LiveTypeService is a service class that sets the type of live broadcast room. The queryObject method is used to query the live category entity, the queryByOrgId method is used to query the live category set by an institution through the institution ID, the queryList method is used to obtain the live category list, the queryTotal method is used to query the total number of live categories, save is used to add live classes, the update is used to modify live types, delete is used to delete live categories, and delete batch is used to delete live categories in batches.

LiveRoomTabService is a service class that sets the menu of the live room and is mainly used to view, add, and delete the menu bar of the live room.

LiveRoomViewCodeService is a service class for setting the viewing code in the live room, which is mainly used to view, modify, and delete the viewing code in the live room.

3.3. Live Broadcast Content Management.
The live content management module is mainly for system administrators and institutional administrators to manage sensitive content, live video, message, live data, and other content. Administra-

tors can view sensitive content screenshots, delete sensitive content, view recording, delete a recording, and view, retrieve, and reset messages in the live room. Here, we focus on sensitive content. When the Tencent cloud server identifies that the live video screenshot is suspected of violation, it will send a message notification in JSON format to the live platform's management end. When the type value is 200, it means that a sharp picture is detected. The notification message will continue to read the link address, picture size, screenshot time, and other information. Then, it encapsulates them into the LiveShotEntity, calls the save method in the LiveShotService, passes in the LiveShotEntity, and then continues to call the save method in the LiveShotDao to save the attribute information in the LiveShotEntity to the data and returns the message of successful saving.

3.4. User Management

3.4.1. Third-Party Login.
Users can chat or comment only after they log in with a third-party account. When users choose third-party login of QQ, they will generate URL through appID, callback address, and random code. When users log in successfully, they will return the code through a callback address. They can get the user's accessToken by calling the qqoauth method in OauthController by code. Use an access token to call the third-party interface to obtain the user's head image, gender, and other identifying information encapsulates it in the map, and return it to the front end.

3.4.2. Watching Live and Recorded Broadcasting.
When the anchor creates a live room in the background, the streaming software can push the live stream to the cloud server through the streaming address. When the cloud server detects the change of a particular streaming stream's status, it will send the new event to our server in JSON format through a callback address. When the event type in the notification message is 1, a particular multicast stream begins to push the stream to the server. At this time, users can start to watch the live broadcast when they click to enter the live room.

3.4.3. Online Chatting.
When the user successfully logs in with a third-party account, the browser will call the getRongYunToken method in RongCloudController and pass in the user ID. This method will generate a digital signature through the key and timestamp t assigned by the developer platform and then send a request to the RongCloud server to obtain the token. When the user obtains the token, it will call connect in the class library provided by RongCloud at the front end. When the user enters the chat message and clicks send, the TextMessage method will push the chat content to the server.

4. Design of the User Recommendation Module

The recommender system consists of three parts. The first part generates user characteristic data, the second part is to match data information, and the third part gives recommendation results. Among them, generating user data is the premise, matching is the foundation, and giving recommendation results is the focus. All three are indispensable.
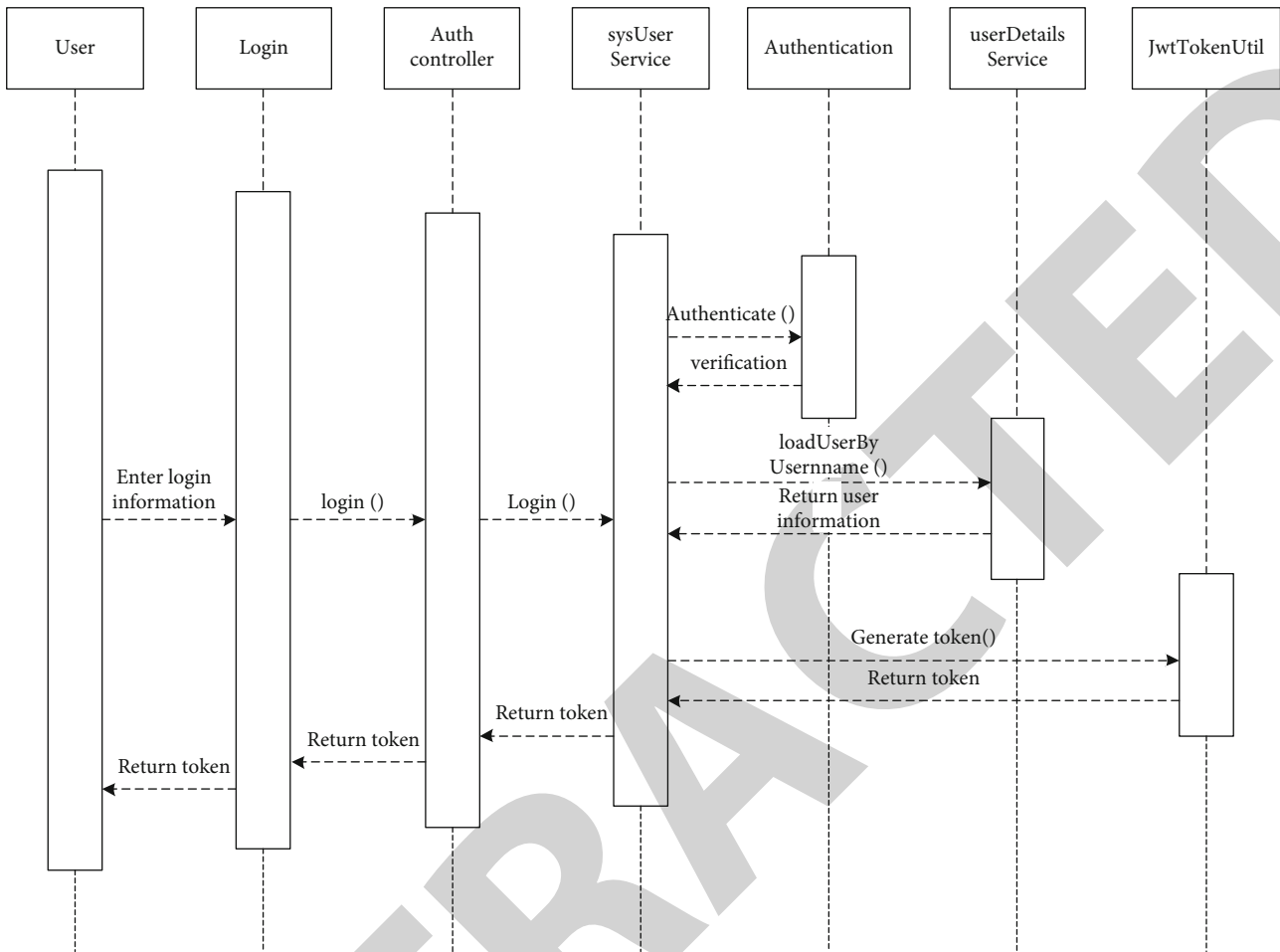
FIGURE 4: Sequence diagram of authentication.

It is necessary to collect many user needs and interests, filter and calculate according to relevant algorithms, extract scores, and make statistics to extract user characteristic data. The general architecture of the recommendation engine system is shown in Figure 6.

Recommendation engine consists of three essential elements:

(1) *User Eigenvector*. The feature vector here refers to the user data. The computer analyzes and extracts the user's behavior (interests, needs) and then converts this behavior into data to generate the user feature vector

(2) *Initial Recommendation Results*. According to the data classification, the data that accord with the user feature vector is preliminarily screened, and the data table is generated

(3) *The Final Recommendation Results*. According to the initial recommendation data table, the final recommendation results are formed after statistical sorting

Here, in particular, the feature extraction of users is based on personal preferences. The data value of personal

preferences can be extracted from the primary operation behavior of users, for example, the length of time users browse a web page, evaluate and collect the item, and the number and frequency of browsing an item. The system's design is mainly based on Hadoop, which is a very reliable, scalable, low-cost distributed computing platform.

This paper uses the Hadoop distributed computing platform to realize the design of the user recommendation engine. The system design is shown in Figure 7.

Additionally, system security is an essential guarantee for the successful operation of the system, so the design and management of system security are crucial in system development. This paper adopts security management, firewall, agent strategy, and secure transmission strategy to secure the system.

(1) Security management strategy

The system will generally have security management settings. For example, during the live broadcast, users can set a multilevel password and access rights to the users participating in the live broadcast. Access is linked to the database and cannot be accessed without the appropriate privileges.
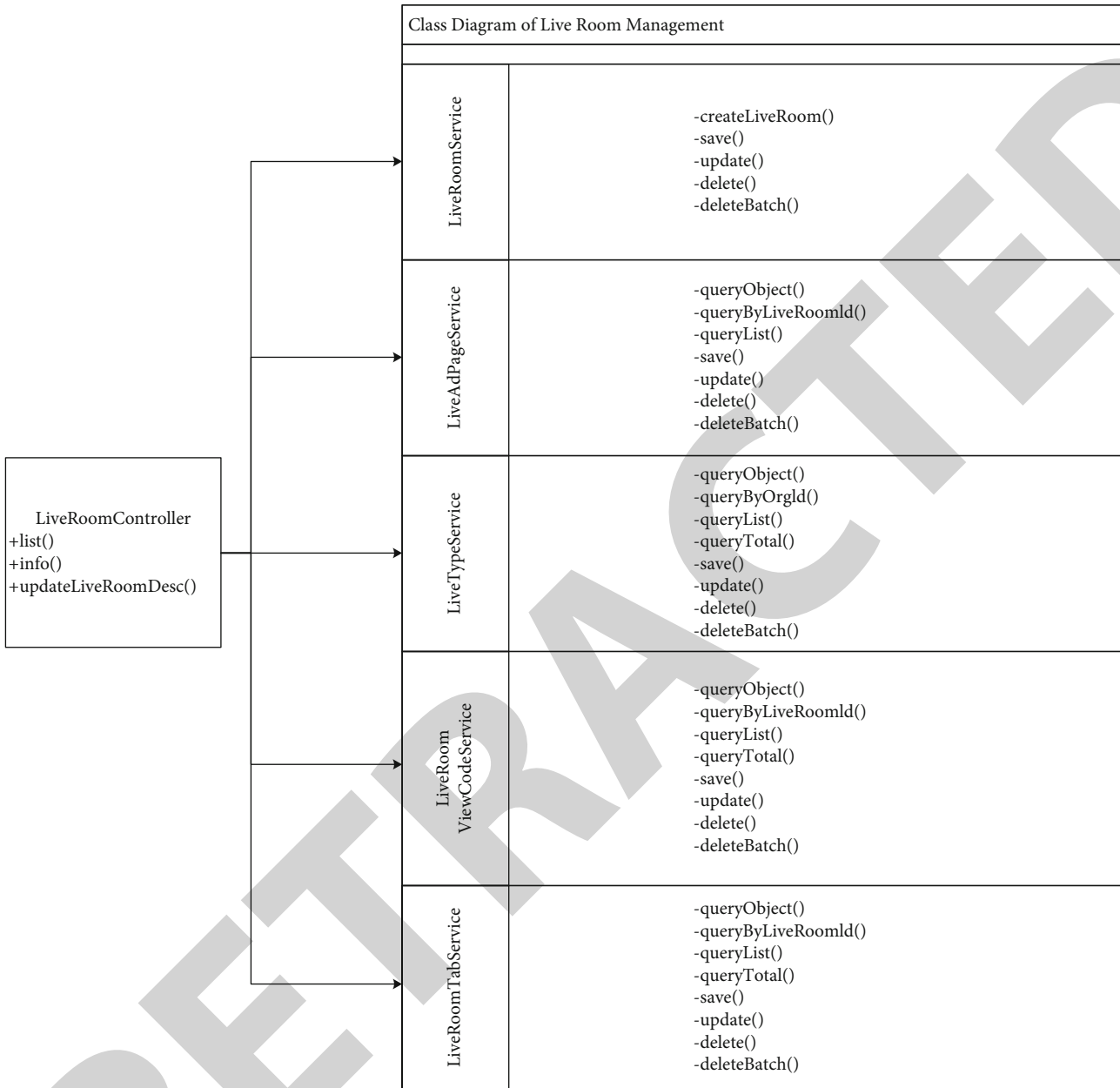
FIGURE 5: Class diagram of live room management.

(2) Firewall and proxy policies

A firewall is the most basic system security; it can have a hardware firewall and software firewall. All the data streams that can access the system are filtered by the firewall first, and only secure data streams can pass so that users can operate the system at ease. Adding a proxy policy can also work as a firewall.

(3) Safe transmission policy

When the system transmits the data, it can be dynamically encrypted in the client. When the server receives a dynamic password request from the client, the server will

be verified and returns the generated password to the client—this way, the data is transmitted in absolute security.

5. Design of the Security Policy Guarantee Module

When users operate on cloud training big data, security measures including data storage security, identity authentication security, trusted access control security, and virtual security begins to work. A complete set of solutions ensure that legitimate users operate on cloud training big data. The security of training big data has also been improved, and the security strategy is shown in Figure 8.
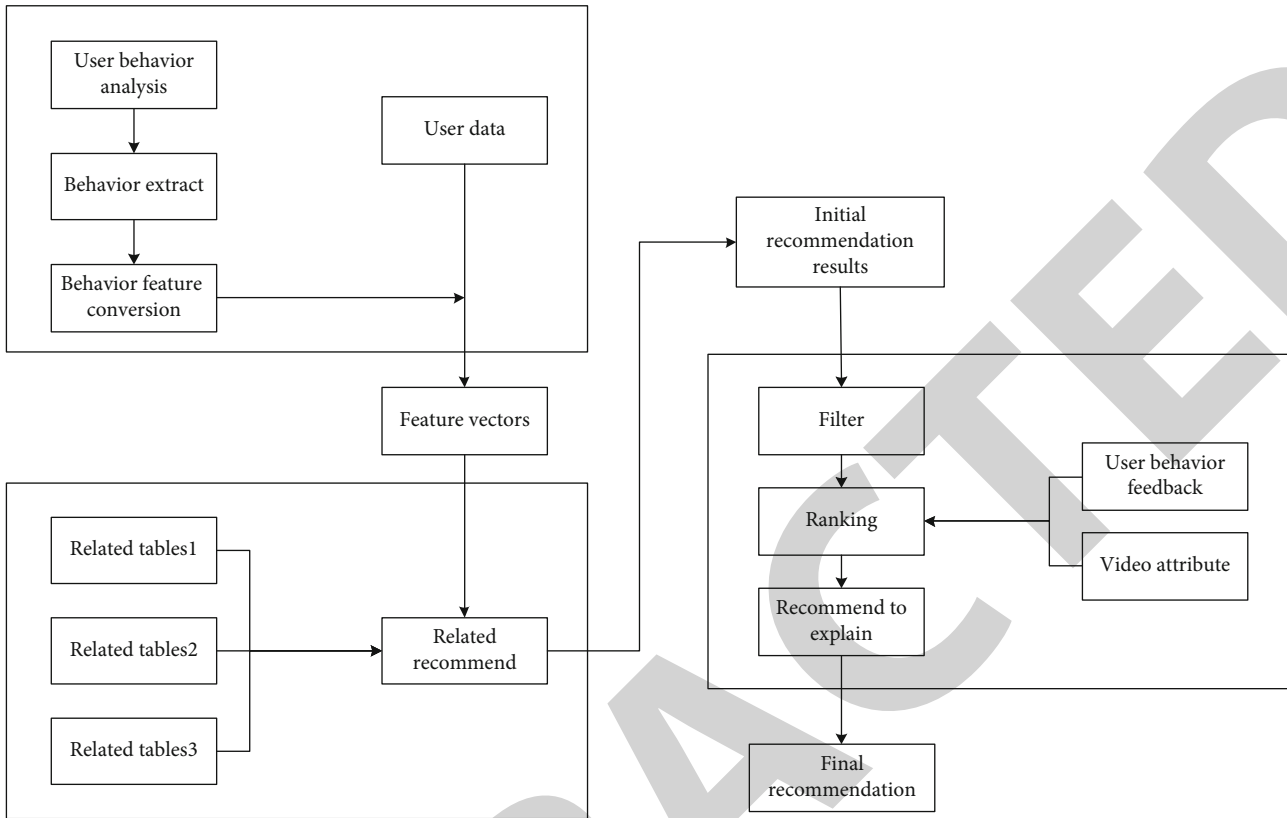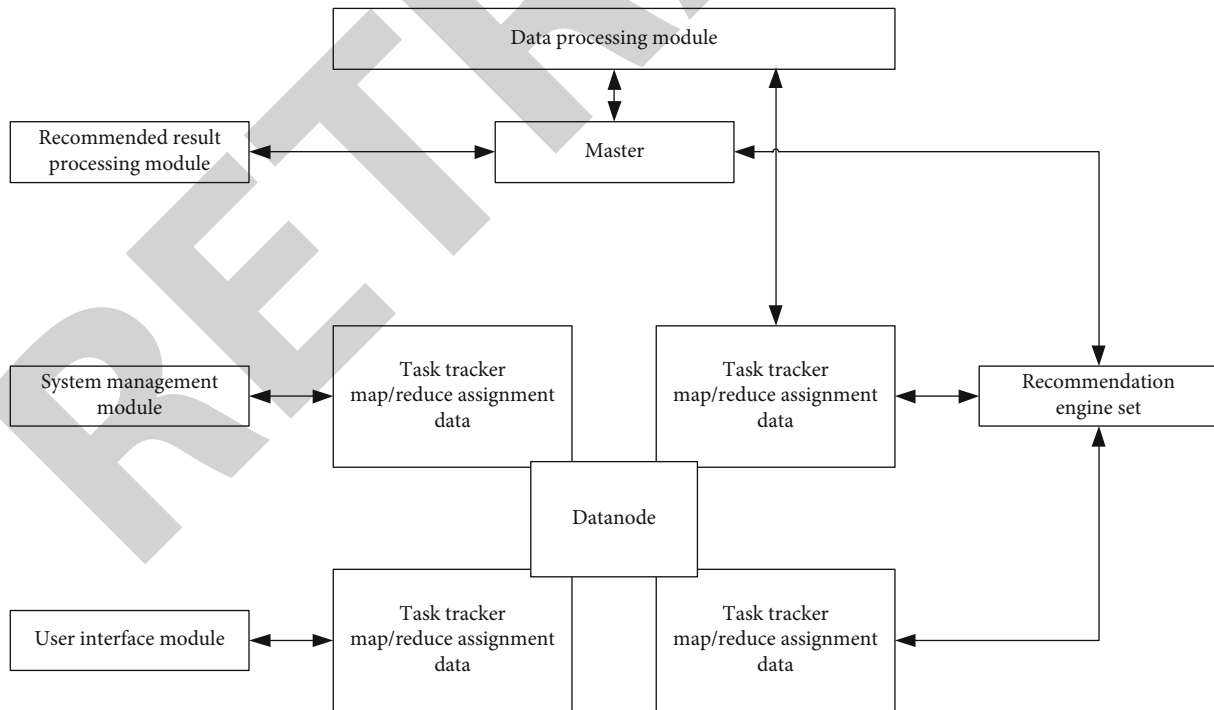
Figure 6: Recommended engine.

Figure 7: System design based on Hadoop.

Users log in with personal login information at the single sign-on entrance and can access the big training data after the application system confirms the identity. The trusted access control based on cryptography effectively restricts the user's behavior to only operate on the data conforming to their permissions.
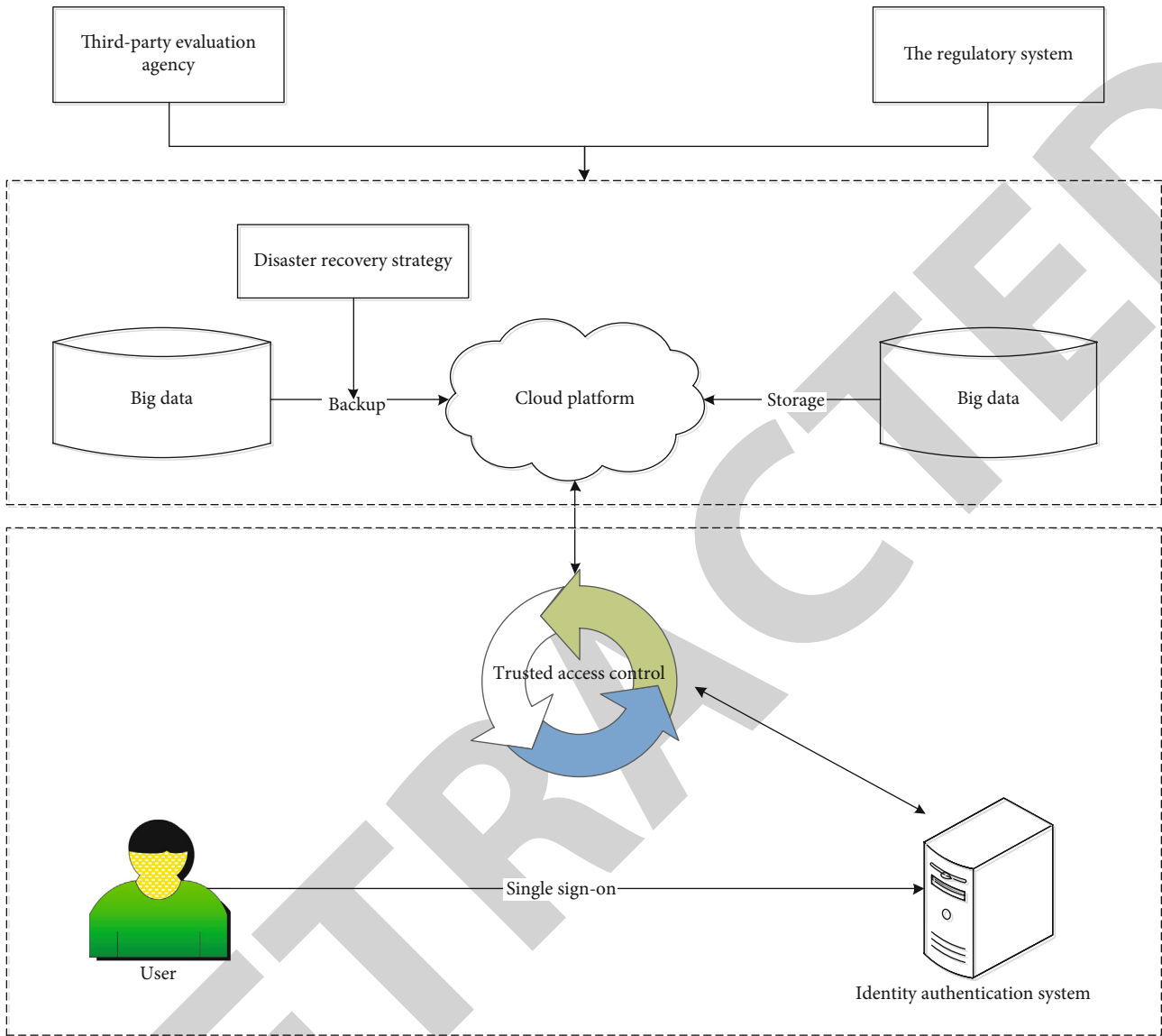
FIGURE 8: Security policy.

The extensive training data stored in the cloud environment is backed up at different levels according to different security levels, and a targeted disaster recovery strategy is established. The file management log will record the operation for each data.

According to the cloud platform's security performance indicators, the third-party evaluation organization evaluates the services provided by cloud service providers and submits the evaluation results to users. The regulatory system supervises cloud service providers' behavior to ensure the security of cloud data and the legitimate rights and interests of users.

The security policy guarantee module protects the big data in the following three ways:

(1) Data backup

Network training big data uploaded to the cloud platform needs to be backed up and a more targeted lattice for data at different levels of confidentiality. Depending on the density level of big data, different backup strategies can be used for public, general, necessary, essential, and core data.

(2) Disaster recovery

Cloud platform service providers for the specific services rented by training institutions formulate specific data disaster recovery strategies. When the cloud environment is attacked or due to power failure, fire, other accidents, and other natural disasters, it can maximize the recovery system, ensure the continuous availability of the cloud platform, and ensure the ample data security of the organization.

(3) Document management log

The establishment of a file management log system for the training data of the institution is another important

guarantee for data security, which can play a supervisory role in supervising the behavior of cloud service providers. Cloud service providers target users with different rights; the records of data operation including the institution management, trainers, and colleges; technical management personnel of the cloud platform; the regular inspection and maintenance records of platform data; and the records of the unauthorized behavior of big data of the institution.

6. Conclusion

In this paper, the live broadcast training platform's structure is founded. The user recommendation module and the security policy guarantee module are used to ensure the integrity of the system functions. The main conclusions are as follows:

(1) The design and implementation of the permission authentication module of the live broadcast cloud platform can realize the accurate division of the user rights of different roles and ensuring the security of the background management end system

(2) The design and implementation of the data management module of the live broadcast cloud platform can ensure that the administrators can effectively manage the institutions, broadcast rooms, and anchors in the forum and to ensure the effective control of the live broadcast cloud platform business

(3) The design and implementation of the live broadcast data management module can ensure the effective monitoring of the live broadcast content and statistical data by anchors and administrators and to ensure the regular operation of the live broadcast business

(4) The design and implementation of the live broadcast platform portal, which can provide users with watching the live broadcast recording, online chat, comment thumb up, and other functions, to ensure the excellent experience of users

(5) The design of the recommended system can accurately push users for the live broadcast platform. The implementation of the security strategy can ensure the system's data security, hardware security, and file security

Data Availability

Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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