

Application of Hybrid Cloud Technology Architecture in the Construction of the Sharing Platform of Experimental Equipments

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Abstract: Hybrid cloud, which combines public cloud and private cloud, is the main mode and development of cloud computing in recent years. It is a very convenient architecture for building cloud applications. Amazon Web Services (AWS) is a secure cloud service platform, which can be easily used to build applications based on hybrid cloud architecture. AWS can provide computing power, database storage, content delivery, and other functions. AWS cloud products and solutions can build flexible, extensible, and highly reliable complex applications. The sharing of experimental equipments provides a solution to the contradiction between insufficient equipments resources and users' strong demands. This paper analyzes the basic functions of the sharing platform of experimental equipments, and then gives the basic architecture of the sharing platform of experimental equipments. Finally, the solution of the sharing platform of experimental equipment based on AWS is given.

1. Introduction

Experimental equipments are one of the scarcest resources in educational resources. The contradiction between the type and quantity of experimental equipments and users is more prominent in colleges of science and engineering or colleges for the purpose of training skilled personnel. However, in the case of lack of experimental equipments resources, there is a waste of resources at the same time. The main reason is that there is no rational allocation and sharing of resources. The sharing of experimental equipments is an effective way to solve the shortage of experimental equipments resources. Colleges are trying to allocate experimental equipments resources more reasonably. At the same time, some related platforms have been constructed. However, with the increase of sharing requirements and the expansion of the scope, such a system can no longer meet the current needs, so these systems need to be upgraded and improved. There are three main ways to reform the existing system: abandon the existing system and redevelop the new system; analyze the current system, and then improve the function; encapsulate the existing system and integrate with the new function. The cost of abandoning the original system for redevelopment will be high on both sides of time and economy. It seems to be a good plan to analyze the existing system and improve its function, but this is based on the premise that the old system development documents remain intact. Therefore, there are great limitations in the above three ways. With the continuous development and progress of cloud technology, building an information sharing platform with hybrid cloud has become a convenient solution, which can preserve the cost of early development, shorten the development cycle, and facilitate the gradual migration of applications and data to the public cloud in the future. Therefore, it is very suitable to choose hybrid cloud technology architecture to establish the sharing platform of experimental equipments.

2. Basic Functions of the Sharing Platform of experimental Equipments

2.1 Description of experimental equipments.

Define a feasible and standardized description method to describe and encapsulate resources in a unified way, which is the basis for effective sharing of equipments.

2.2 Management of experimental equipments

The core function of the experimental equipments management system is how to allocate various experimental equipments effectively, which is one of the important tasks of constructing the sharing platform of experimental equipments.

2.3 Registration and discovery of experimental equipments

Provide an access entry based on cloud service to facilitate users to find the equipments they need accurately and quickly.

3. General structure of the sharing platform of experimental equipments

Hybrid cloud is a cloud storage environment based on private cloud and public cloud services, which provides and manages some internal and external resources for specific users [1]. The architecture of hybrid cloud storage system can be divided into four layers: resource layer, platform layer, application layer, and user access layer [2]. Amazon Web Services (AWS) cloud provides a variety of infrastructure services, such as computing power, storage options, networking and database services and so on. From data warehouse to deployment tools, from directory to content distribution, AWS has all kinds of functions. Using AWS can quickly configure various new services, with the help of various deep functions such as database engine, server configuration, encryption and powerful big data tools, users can focus on the core business. The sharing platform of experimental equipments is based on the high development of network educational technology standard research and network construction. Through the research of existing educational resources sharing systems, the deep functions, special connection, joint identity, and integrated tools based on AWS can run "hybrid" application program in multiple local and cloud services. By using the "hybrid" application program, the sharing platform of experimental equipments based on AWS is constructed. The general structure of the platform is shown in Figure 1.

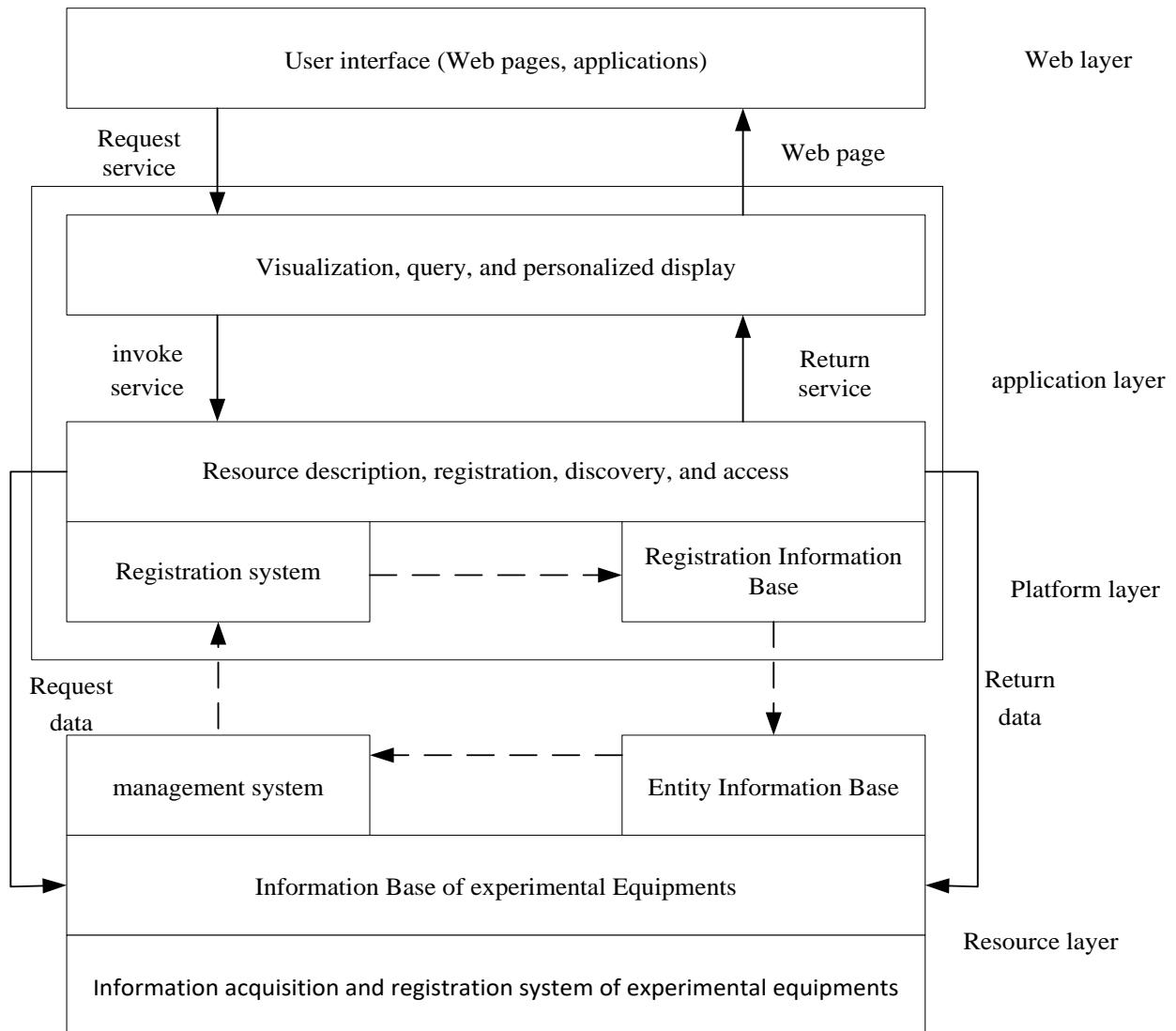


Figure 1. General structure of the sharing platform of experimental equipment

4. Characteristics of Hybrid Cloud Technology

As a combination of public cloud and private cloud, hybrid cloud has the advantages of both. It combines the low cost investment and extensibility of public cloud and security and controllability of private cloud. As a result, the application scenarios of hybrid cloud are becoming more and more abundant. More and more users, including colleges and universities, begin to deploy their application systems in the cloud computing environment of hybrid cloud. Because public cloud has the characteristics of high extensibility, the system applications are deployed on the public cloud. While private cloud are high reliable, so the databases and critical data are deployed on private cloud, and allows other applications to access data on private cloud across public cloud. Through the deployment of hybrid cloud, it not only has extensibility, but also guarantees the reliability of data and reduces the cost of hardware to a certain extent. Simply put, hybrid cloud technology has the following three main characteristics:

4.1 High Integration

Private cloud is more secure than public cloud, but the computing resources of public cloud are beyond the reach of private cloud. In this case, hybrid cloud can better neutralize this problem. It can not only use the security of private cloud to store important data in the local data center, but also use the computing resources of public cloud to work more efficiently and quickly, which

combines the advantages of private cloud and public cloud and makes up for the shortcomings of private cloud and public cloud respectively.

4.2 Extensibility

Hybrid cloud breaks through the hardware limitation of private cloud. With the extensibility of public cloud, higher computing power can be obtained at any time. By transferring some computation or non-secret data to public cloud, pressure and demand for internal private cloud can be reduced.

4.3 More cost savings

Hybrid cloud can utilize both public cloud resources and private cloud resources according to actual needs. It does not need to put all computations and storages in the local private cloud data center, thus reducing the use of hardware resources of private cloud. Faced with the increasing demand for computing and storage resources, it can effectively reduce costs.

5. Basic Framework of the Sharing Platform of Experimental Equipments with Hybrid Architecture

Hybrid cloud combines the characteristics of public cloud and private cloud, and has the advantages of both. More and more users begin to deploy application systems in hybrid cloud computing environment. Deploying application systems on public cloud can improve extensibility, and deploying data on private cloud can ensure security. Hybrid architecture is a process leading to cloud, the existence of which has a very practical significance. First, hybrid architecture can retain the initial investment of existing users, and at the same time, it can meet the current users' habits to the greatest extent. AWS provides very rich services of hybrid architecture, which can help users easily complete the transition from local application to cloud computing environment[3] [4].

Hybrid architecture refers to the combination of internal and external services, through the combination of public cloud and existing information systems to achieve business systems. The advantage of hybrid architecture is that it can continue to use the existing infrastructure, control costs, maintain functional characteristics, has both openness and independence, and use hybrid cloud service platform to provide users with characteristic and personalized services [3]. The concept of hybrid cloud is not a simple hybrid service provision, but a very complex process of how to switch and merge public and private clouds services correctly and effectively [4]. AWS provides a variety of cloud services (Amazon Virtual Private Cloud, Virtual Private Network, AWS Direct Connect, Directory Services, AWS Import/Export, AWS Storage Gateway, etc.) to implement the architecture of hybrid cloud. At present, many colleges and universities have established the equipments sharing systems of different scales. It is impossible to integrate them into cloud to provide services in a short time. It is a feasible solution to integrate these resource systems into cloud service platform by using hybrid architecture. Direct Connect service is used to connect all existing equipments sharing systems to public cloud to provide services, while the actual data, applications, and so on remain in their original state. The basic structure is shown in Figure 2.

6. Module design of the sharing platform of experimental equipments

The sharing platform of experimental equipment based on AWS mainly provides the functions of creation, query, publication, and management to the outside world, with the functions of corresponding log, mail alarm, and so on. Therefore, the system is mainly divided into creation, query, publication, and management modules.

The registration module completes the registration, verification, and storage of experimental projects. The publication module accomplishes the publication of experimental projects, including the creation of information needed to be published and the rules for publishing information, as well as the information provided and needed for experimental projects. The query module completes the

search function for the related experimental projects, including the query for the experimental projects provided and needed. The management module completes the management and authorization of users, and platform security monitoring, and so on.

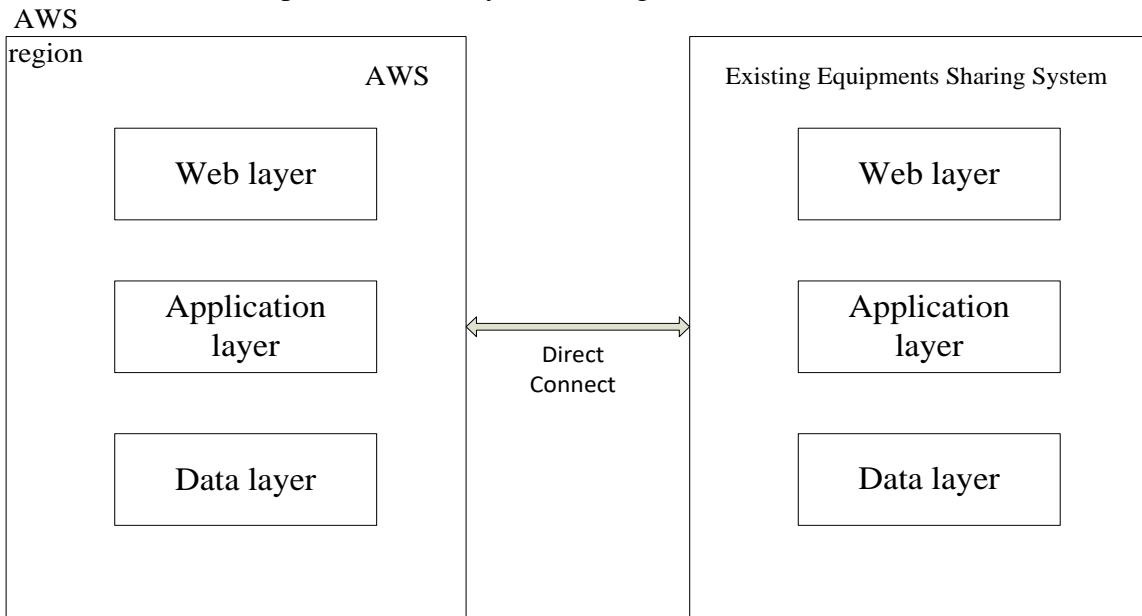


Figure 2. The sharing platform of experimental equipments with hybrid architecture

7. Conclusion

Hybrid cloud technology has a good application prospect in the construction of the sharing platform of experimental equipments. It improves the convenience of system maintenance and ensures the security of data. The emergence of hybrid cloud technology architecture provides a new idea for the construction of the sharing platform of experimental equipments. From the material aspect, it can achieve the purpose of saving investment and make full use of experimental instruments and equipments. From the human aspect, it can enable more students to use the corresponding experimental equipments according to their interests and hobbies, improve their practical ability, and make a better reserve for entering into society in the future.

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