

Research on the Integration of Cloud Computing and Education Resource Sharing Scheme

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Abstract: Through the study of cloud computing technology, we analyze the significance of the integration of cloud computing and education resource sharing, and design a four-layer model architecture for the integration of cloud computing and education resource sharing platform based on the three-layer architecture of cloud computing, and elaborate the specific implementation functions of its resource layer, platform layer, application layer and login access layer, respectively, to deeply integrate cloud computing and education resource sharing.

Keywords: Cloud Computing, Education Resource Sharing, Information Silos.

1. Introduction

The importance of education as the foundation of our country is indisputable. The talents cultivated under the traditional education model are engaged in technological innovation, which in turn drives the innovation and development of our education model, education methods, and learning resources, forming a positive cycle. Therefore, at the current stage of rapid development of "education informatization and digitization", the organic integration of cloud computing and educational resource sharing is conducive to promoting the reform of education models and educational methods, and improving the efficiency and quality of meeting the development of digital society and the cultivation of innovative and technical talents. In 2008, Lai [1] forward-lookingly proposed to explore the impact of "cloud computing" on the construction of educational resources and changes in educational models, and to study the "cloud" mechanism of educational informatization. Zhang Long et al. conducted a preliminary exploration of "cloud computing" assisted education, and through the investigation of "cloud computing" assisted several education application modes, they concluded that "cloud computing" assisted education teaching practice can The feasibility of the organic integration of "cloud computing" and education has been verified [2]. Zeng Wenxiong [3] proposed in 2011 that cloud-based educational resource sharing would provide society with a quality and quantity online educational resource service system, which is the trend. According to the characteristics of adult online education, Sun et al. suggested in 2014 to integrate existing hardware resources and then use "cloud computing" technology to generate a personalized virtual service platform against the actual educational resource demand, which will intelligently adjust the hardware resource allocation dynamically according to the number of learners online to achieve the goal of resource saving [4]. In 2018, Wu Zheng analyzed the application of "cloud computing" in modern digital teaching and tried to explore a learning cloud service platform based on "cloud computing" technology, and proposed the possible problems in the construction process of this platform [5].

Nowadays, educational resource platforms are developing rapidly under the dual role of digital society development and normalization of epidemic prevention and

control, however, some problems are also revealed in the process of their development, such as the duplication of some educational resources and information islands, and how to solve the problems of imbalance of educational resources and low utilization of resources among regions in the context of uneven economic development. Therefore, this paper will provide suggestions and references for the educational resource sharing service platform by analyzing the advantages of the integration of cloud computing and educational resource sharing and designing a three-tier architecture of cloud computing and educational resource sharing integration scheme.

Table 1. Three Scheme comparing

Number	Scheme 1	Scheme 2	Scheme 3
1	456	456	123
2	789	213	644
3	213	654	649

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2. The Significance of The Integration of Cloud Computing and Education Resource Sharing

2.1. Reduced capital investment and economic costs

In the past, schools needed to spend a lot of money to add hardware facilities and network resources in the early stage of establishing their own data centers, and needed full-time staff to maintain and manage the data centers, which not only consumed a lot of manpower and resources, but also came with uncertainties, such as hardware damage, malicious attacks on data centers, and hardware and software updates and iterations. When education resource sharing and cloud computing are integrated, the procurement needs of hardware equipment for each education department and school will be greatly reduced, and there will be no need for full-time personnel to manage and maintain them, so the initial

investment cost and later operation and maintenance cost will be greatly reduced. Enterprises use cloud computing to integrate educational resources through virtualization software and build educational resource sharing platforms to serve education departments and schools. As Figure 1 shows the return on investment ratio of cloud computing technology support and traditional data center.

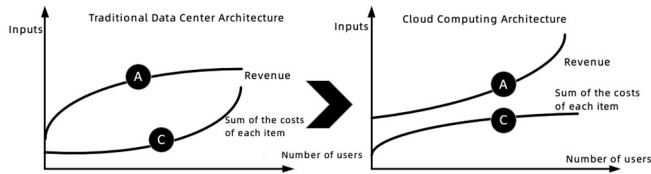


Figure 1. Return on Investment Chart

2.2. Avoid hardware iterations and secure your data

Security is the primary issue of data storage. In the traditional data center model hardware encounters inevitable damage and iteration when the migration of old data is a large, complex and tedious process, in which data loss is very likely to occur. If the application of cloud computing technology, the use of large data processing servers provided by the enterprise to store data in the cloud will be faster and easier to operate data. In the physical architecture, cloud computing uses a distributed system, which not only has a variety of security authentication mechanisms and is equipped with professional monitoring and testing equipment and professional operation and maintenance personnel to ensure the security of data. Administrators can also classify and store educational resources in a hierarchical manner and open different sharing privileges according to the level of resource users, thus further improving the security of data resources.

2.3. Efficient use of resources and elimination of information silos

Traditional data centers are built by departments and schools, so their services are not open to the public. However, in the context of uneven economic development, the construction of data centers by themselves not only increases the imbalance of educational resources to a certain extent, but also results in the duplication of educational resources, low utilization of educational resources and information silos. The cloud computing services provided by enterprises are standardized through the access standards and interfaces, so that all users within the scope of their provision, including education departments and schools at all levels, can share educational resources, and manage and dispatch educational resources in a coordinated manner, and improve the sharing mechanism through cloud computing. In this way, departments and schools at all levels will avoid duplication of educational resources, and make the same educational resources shared between the more backward and developed regions, which is conducive to promoting educational equity and eliminating information silos.

2.4. Real-time updated resources to provide accurate services

The cloud computing environment allows everyone to upload learning resources they find valuable and communicate with others online, making it truly "shared", and

the system is also connected to the network so that educational resources can be updated in real time. In the past, even with the help of some algorithms to extract user characteristics, it was difficult to find out the real needs of users because the data centers built by departments and schools at all levels were not large enough. But with the huge data support provided by the cloud computing environment, the big data technology can be used to analyze the user habits and establish the user demand model, and provide personalized and differentiated educational resources push service for each user through the analysis of the user, which helps the user to know the latest information and educational resources in the field of their concern at the first time.

3. Cloud Computing Three-tier Architecture and Education Resource Sharing Integration

3.1. Cloud computing three-tier architecture

With the continuous development of technology, cloud computing at this stage is not only a kind of distributed computing, but also the result of the evolution and leap forward of a mixture of computer technologies such as distributed computing, utility computing, load balancing, parallel computing, network storage, hot backup redundancy and virtualization. The commonly accepted cloud computing architecture is divided into three layers: IaaS (Infrastructure as a Service), which refers to Infrastructure as a Service, PaaS (Platform as a Service), which refers to Platform as a Service, and SaaS (Software as a Service), which refers to Software as a Service [6]. Figure 2 illustrates the three-tier architecture of cloud computing:

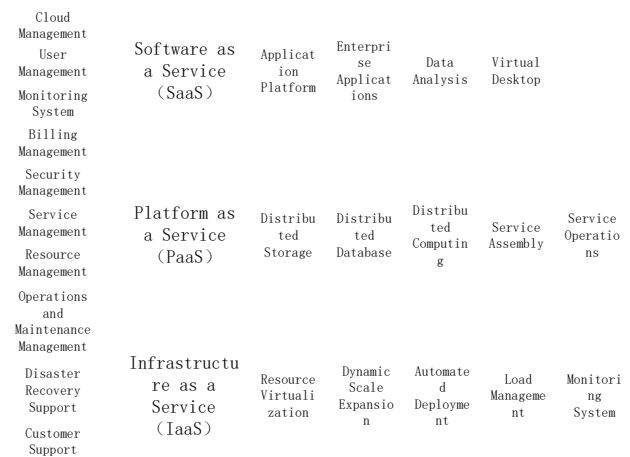


Figure 2. Cloud computing three-tier architecture

(1) SaaS (Software as a Service)

SaaS refers to the provision of software services for customers through Internet technology. The application software used by customers is provided by the SaaS platform provider, which is deployed on all servers of the provider, and customers only need to pay for the SaaS platform provider according to the intensity of their demand for the application software. SaaS platform saves customers a lot of upfront investment in local deployment and provides better services for enterprises.

(2) PaaS (Platform as a Service)

The essence of PaaS is to provide the server platform owned by the original SaaS platform provider directly to the

customer, and directly provide the software deployment platform for the customer, so PaaS is also an application of SaaS model and indirectly promote the development of SaaS. Through the development environment and tools of the software deployment platform, customers can customize and develop application software to meet their own business logic and needs, i.e. PaaS provides a platform for customers to independently develop, test and deploy application software.

(3) IaaS (Infrastructure as a Service)

IaaS refers to the provision of Internet infrastructure as a service to customers, a service in which customers rent hardware resources from suppliers according to their needs and pay for them according to the actual amount of resources they occupy. The famous foreign cloud computing service platforms include Amazon's AWS, Microsoft's Azure Cloud, etc., and the famous domestic ones by Ali Cloud, Baidu Cloud, etc. In the IaaS model customers can deploy personal resources, application software, etc. according to their own needs on the rented infrastructure platform, while the management and maintenance of the infrastructure is provided by the provider. This not only provides customers with high-quality cloud services, but also makes full use of the infrastructure resources, which can effectively avoid the waste of Internet resources.

3.2. Four-layer architecture of cloud-based educational resource sharing platform

Through the above analysis, the fusion of cloud computing and education resource sharing will provide economic, efficient, secure and accurate data resource services for education departments and schools at all levels. Therefore, the layered model of cloud computing-based education resource sharing platform based on the three-layer architecture of cloud computing is proposed in Figure 3, and the model is designed as a bottom-up four-layer structure based on the fusion of the three-layer architecture of cloud computing.

(1) The resource layer is the bottom layer of the education resource sharing platform architecture, which automates the deployment of server clusters, hosts, storage devices and network resource devices, and integrates and virtualizes many devices into a resource cluster to provide data storage, computing, monitoring and maintenance, and disaster recovery and backup services for customers, and specifies different standards for education departments and schools to choose to use according to different payment fees.

(2) The platform layer is the premise that education departments and schools at all levels pay for the education resource sharing platform. The supplier provides all the management services such as task management, resource scheduling management, operation and maintenance support, etc., and provides customers with Internet service modules, database platforms, program running platforms, development and testing platforms, and various middleware required through distributed computing and parallel computing technologies. Along with the use of customer service push platform will rely on big data technology, data analysis technology to extract customer characteristics, accurate grasp of customer needs and areas of concern and through the platform in real time for customers to push targeted data accurate services.

(3) The application layer is actually the core layer of the education resource sharing platform architecture, providing cloud resources and cloud management modules for education departments and schools at all levels under the

supervision of the enterprise. Cloud resources include application software accessed by customers to the cloud and curriculum resources and multimedia courseware uploaded by teachers to the cloud, and various online resources such as e-books, video resources and foreign education resources connected by various clouds. Cloud management mainly provides different privileges and corresponding services for different customers, and provides a platform for real-time interactive communication and information query module for customers.

(4) The login access layer provides a unified interface for education departments and schools at all levels to login to the cloud platform, whose functions include account registration, teacher-student identity authentication, etc., and access to the cloud platform with different levels of resource access rights and information query rights according to the login user types. The login access layer realizes the use environment with all application software, including various networked terminal devices such as computers, cell phones and tablets, and all successfully logged-in users can upload valuable educational resources through open permissions to maintain the vitality of the educational resource sharing platform and realize the sharing of resources in the true sense.

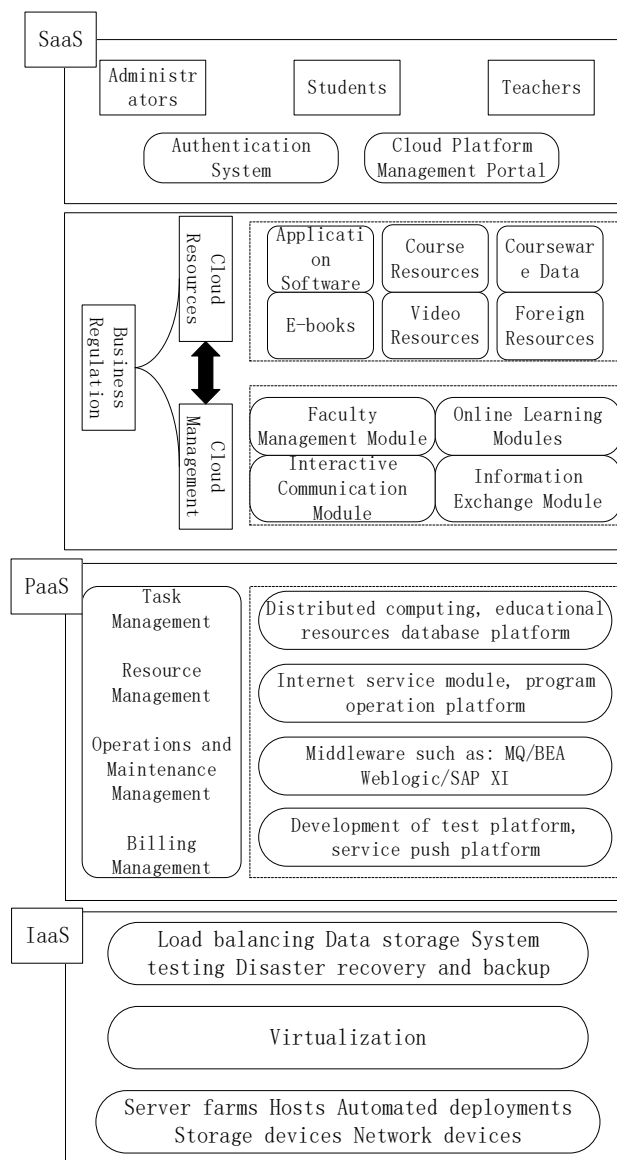


Figure 3. Four-tier structure of education resource sharing platform

4. Conclusion

On the one hand, the organic integration of cloud computing and education resource sharing platform realizes the integration, optimization and upgrading of education resources of education departments and schools at all levels, which is conducive to narrowing the gap in the quality of education resources between regions, realizing the balanced development of education resources in each region, breaking the long-standing information barriers between education departments and schools, and connecting information silos. On the other hand, the advantages of low cost, high efficiency, safety and reliability, and accurate services of the integration of cloud computing and education resource sharing platform meet most of the needs of its users, prompting the integration of cloud computing and education resource sharing platform to become a new trend.

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