



Decision Support System Model of Education Management Based on Cloud Storage Technology

Jianxiang Wang^(✉)

Urban Vocational College of Sichuan, Chengdu 610101, Sichuan, China
scy2022@126.com

Abstract. This paper theoretically expounds the concept of cloud storage technology, and demonstrates the core application of cloud storage technology in educational management decision support system. Model management is not only the focus of decision support system research, but also the key to the practicability and success of decision support system. Flexible and practical model management is of great significance to assist decision-makers to understand complex practical problems, select appropriate models and improve the effectiveness of decision-making.

Keywords: Cloud storage technology · Education management · Decision support system · System model

1 Introduction

With the rapid development of the information age, the outside world has brought us more and more big information. A large amount of information not only brings convenience to people, but also brings a lot of trouble: too much information is difficult to digest, true and false information is difficult to identify, information security is difficult to ensure, and information format is difficult to unify. In the vast ocean of information, how can we not be submerged by information and find useful information in time? Therefore, this paper studies the model of education management decision support system based on cloud storage technology.

Due to the different application fields and research methods of decision support system, the structure of decision support system has many forms. The structure of decision support system based on model base and knowledge base and combined with expert system is called intelligent decision support system [1]. The decision support system based on data warehouse, online analytical processing and data mining is called the new decision support system. The integrated decision support system formed by integrating the above two decision support systems is a new development direction of decision support system. In order to better realize the purpose of auxiliary decision-making, data warehouse still needs the support of model. Model base system is an important part of

decision support system. The quality of model determines the performance of decision support system. Conclusion cloud storage technology and establishing a reasonable and effective decision model can enable the decision support system to make effective decisions when dealing with semi-structured and unstructured decision problems, which is of great significance to help decision makers understand decision problems and implement decision schemes. The cloud storage technology is shown in Fig. 1.

The concept of “cloud” was first born on the Internet. With its development, cloud technology has been applied in all walks of life. “Cloud” is a metaphor. It is usually the back end, which is difficult to see. It makes people feel nihilistic, so it is called “cloud”.

The construction of safe city and smart city promotes the application of security cloud storage technology. Smart city puts forward that one of its major requirements is to link and share video storage data with each other. For example, in the case of crime tracking, public security, transportation, civil industries and other multi-range storage data can be shared, and this sharing has the characteristics of cloud storage; Traditional storage technology can not meet the needs of social development, so the application of cloud storage in the field of security becomes inevitable.

At present, several safe cities in China have made attempts. In the future, with the help of the large-scale application of smart cities, we will gather people’s strength to promote the improvement of relevant application standards. We believe that we can promote the application of cloud storage in the security field faster.

In terms of current application requirements, some industry users, such as oil, coal, gold, etc., need to aggregate all data for analysis and processing. This demand can create a private cloud; Some users want to build the whole monitoring system, but they don’t want to spend too much energy. They also hope that all the data of the whole city can be shared and can be linked in time in case of accidents. This can adopt the common cloud method. If these application modes are widely used, it will have a significant impact on the traditional security engineering companies and integrators.

In the future, through cloud storage, more and more IT industry technologies and concepts will be introduced into security, and the traditional security will encounter more and more challenges. Some insiders even predict that the security industry will gradually be assimilated by it. There are still restrictions on the promotion of cloud storage technology in the security field. As the main branch of the security field, video surveillance consumes a lot of broadband data.

From the “cloud” of the Internet to the “cloud” of the security field, “cloud security” can be described as an exotic product. However, in the current market with diversified security storage technologies, cloud storage technology still stays in the demand and concept hype. It will be a long way to go if it really needs to be applied in a large area and occupy a place in the market. However, with the construction of smart cities and the investment in the construction of the Internet of things, it can be predicted that the future application of cloud storage technology in the security field will have a better prospect.

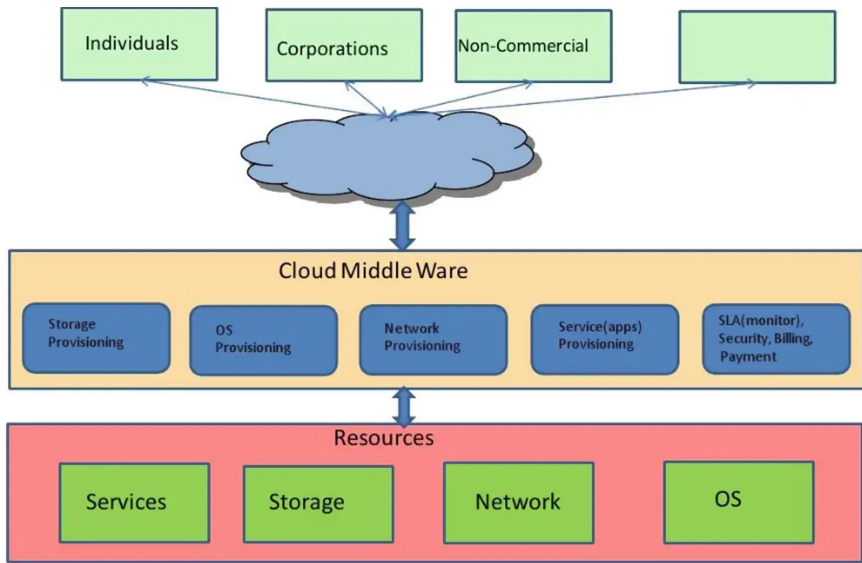


Fig. 1. The cloud storage technology

2 Cloud Storage Technology

2.1 Overview of Cloud Storage

Cloud computing not only represents an important development direction of information and communication technology and information service provision in the future, but also can effectively reduce energy consumption, which is in line with the overall development trend of green and energy saving. In 2010, the Chinese government decided to carry out the pilot demonstration work of innovative development of cloud computing services in Beijing, Shanghai, Hangzhou, Shenzhen, Guangdong and Wuxi, Jiangsu, so as to promote the construction and development of China's cloud computing industry. China's telecom operators also attach great importance to the development of cloud computing [2–4]. The three telecom operators have put forward their own cloud computing development strategies. Cloud computing technology developed rapidly in 2010: IBM integrated resources and launched comprehensive cloud computing solutions such as a new cloud service provider platform; Intel released cloud builder plan; Huawei released cloud development strategy and solutions; Cisco demonstrated the urban cloud platform based on the overall scheme of virtual computing environment Alliance (VCE) [5–8].

Cloud storage is a new concept extended and developed from the concept of cloud computing. It refers to a system that gathers a large number of different types of storage devices in the network through application software to work together and jointly provide data storage and business access functions through cluster applications, grid technology or distributed file system. Fundamentally speaking, cloud storage is a practical service, which can provide many users with a shared storage pool accessed through the network [9].

Cloud storage is an ideal form of expansion and may eventually replace internally archived data. Whether in the high-performance and high-cost side of the storage field, or in the high-capacity and low-cost side, the choice of storage technology will become more and more abundant. And the benefits of cloud storage are impressive. Cloud storage can provide almost unlimited scalability and a “pay as you go” model, which is particularly attractive for lower level and archive storage. From a physical point of view, the cloud is remote, allowing enterprises to obtain data for disaster recovery protection off-site [10–12]. As an outsourcing service, cloud storage can also simplify storage management and avoid the trouble of maintaining storage infrastructure.

2.2 Characteristics of Cloud Storage

Cloud storage is a new type of storage service. Service providers provide storage capacity and data storage services to customers through the network. At the same time, customers do not know the specific implementation details and underlying mechanism. Compared with traditional storage devices, cloud storage is not only a hardware, but a complex system composed of network devices, storage devices, servers, application software, public access interfaces, access networks, and client programs. Each part takes the storage device as the core and provides data storage and business access services through application software. All devices in the cloud storage system are completely transparent to users. Users only need to connect to the cloud through the network to access data. Users who need storage services no longer need to establish their own data center, but only need to apply for storage services from SSP (storage service provider), thus saving expensive software and hardware infrastructure investment. Compared with traditional centralized data storage solutions, efficient clustered cloud storage systems have the advantages of easy capacity expansion (including bandwidth), lower cost, safer data, uninterrupted service and so on [13–15].

As a popular emerging market, “cloud storage” has blossomed everywhere in China in just a few years. We can see that the “cloud” we need includes Chu115, Jinshan online disk, Tencent transit, Xunlei online disk, baidu online disk, and cloud storage on many brands of smart phones or online TVs. This is an attractive big cake with broad prospects. Many businesses want to get a piece of it.

In addition to the rapid development of domestic cloud storage business, what is more unexpected is the enthusiasm of domestic users. The 2012–2016 China Network Storage Market Research and future development trend report shows that by the first quarter of 2012, the number of registered users of a large SSP in China had exceeded 3million, and the number of registered users of other SSPs was also comparable. However, compared with nearly 500million domestic Internet users, these figures still have a huge space for development. You know, the number of customers of Dropbox in the United States in the first three years was less than one million, but now it has far exceeded five million.

The domestic cloud industry is still in its infancy. The development of the market is not mature enough and faces many challenges. Although there are only a few foreign SSPs with great influence, their customers and businesses are relatively stable. Businesses can make up their minds to carry out various long-term businesses stably. However, the domestic cloud storage market has just started. The development stage of stability and mutual trust between customers and SSP has not yet entered. The market is

not mature enough. There are still many unstable conditions in the business of customers and ssp.

3 Education Management Decision Support System Model Based on Cloud Storage Technology

3.1 Technical Architecture of Decision Support System

Using cloud services to improve decision support services is mainly based on the following decision analysis characteristics:

- (1) From the dynamic nature of decision support. In the cloud manufacturing system, the demand of tasks is the comprehensive demand for various manufacturing resources and capabilities. At the same time, manufacturing tasks have a wide range of applications, the demand is dynamic, random and large-scale. Therefore, the service system performing these complex decision-making tasks should also have corresponding complexity and dynamics. Decision support services need to use distributed information environment, including end users and loosely coupled knowledge sources. Its problem-oriented and demand driven problem processing method is similar to cloud services.
- (2) From the knowledge of decision support. Cloud service belongs to web service. It is a semantic rich web service obtained by uniformly embedding, encapsulating and virtualizing resources, information and knowledge through the Internet and other media in the cloud manufacturing platform. The acquisition, reasoning and integration of knowledge are the basis of decision support system. The completeness and accuracy of knowledge will directly affect the quality of decision-making. Therefore, with the help of rich semantic services in cloud manufacturing system, the problem of data inconsistency in decision support system can be effectively solved.
- (3) From the systematicness of decision support. Cloud manufacturing virtualizes and serves all kinds of software and hardware manufacturing resources and manufacturing capabilities, carries out unified and centralized management and operation, realizes intelligent, win-win, universal and efficient sharing and collaboration, and provides safe, reliable, high-quality and cheap services that can be obtained at any time and used on demand for the product manufacturing process through the network. Decision support system also needs to virtualize design knowledge and information resources by using virtualization technology. In the process of realizing the transparent mapping of virtual resources, it weakens the physical dependence between resources at different levels, so as to realize the purpose of dynamic allocation and use of resources in virtual environment.

Based on the above considerations and referring to the traditional tripartite architecture of Web services, the author puts forward the technical architecture of decision support system based on cloud services. As shown in Fig. 1, the whole technical architecture consists of Requirements Driven Architecture (RDA), service - oriented architecture

(SOA), decision management architecture (DMA) It is composed of cloud infrastructure and semantic web, which jointly realize the decision-making ability of the system (See Fig. 2).

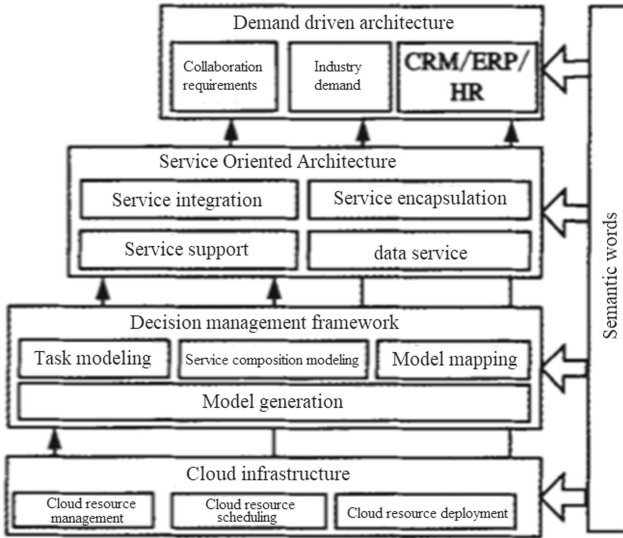


Fig. 2. Technical architecture of decision support system based on cloud service

Users access the system through the web access interface. In, RDA is at the core of the technical architecture of the whole decision support system the top layer, including collaboration requirements, industry requirements and CRM/ERP requirements, completes the transformation process of decision model construction with the help of service integration in the lower SOA; As an application construction method, SOA ensures that the services in cloud infrastructure can be developed and combined quickly to realize the non functional requirements in cloud services. Through a series of cloud service architecture operation such as service integration, service encapsulation and service support, it ensures that the infrastructure can meet various needs of applications; DMA provides runtime decision service support, including decision task modeling, decision service composition modeling, mapping from decision task model to decision service model, model generation and so on; Cloud infrastructure provides the relevant software and hardware environment under the cloud service platform to automatically deploy the standard SOA operating environment, including cloud resource management, cloud resource scheduling, cloud resource deployment, etc.

At the same time, the semantic web based on extensible markup language (XML) and resource description framework (RDF) runs through the whole decision support system based on cloud services, providing standardized metadata syntax specification and metadata semantic description specification for the whole technical architecture and describing the relationship between resources and resources at all levels.

3.2 Decision Task Submission and Decomposition Model

In the process of solving the decision task, firstly, the decision task should be gradually decomposed into sub problem units and the action sequence of the decision task should be assigned; Then, each sub problem unit is assigned to each calculation node, and the solution results of sub problem units are gradually summarized and synthesized according to the decomposition level; Finally, the reference results or solution resources of decision-making tasks at all levels are obtained.

There are decision task sets $d = \{D1, D2, \dots, Dn\}$ ($n \in R$) and calculation node sets $s = \{S1, S2, \dots, Sm\}$ ($m \in R$), as shown in Fig. 3.

- (1) When the user inputs the decision task, the platform decomposes the decision task according to the solution logic of the model management method, sorts it, and selects the first action sequence D1.
- (2) D1. Inform D2 and D3 of the status of the whole operation and that they are one of the sequences of the current decision-making operation. At the same time, D2 and D3 regularly detect whether D1 and D3 are still working normally.
- (3) D1 obtains the available set of computing nodes by querying the system, and selects all or part of the slave nodes to perform decision computing tasks.
- (4) When D1 fails, D2 and D3 will continue to detect the job status and select a new master node through the distribution process.

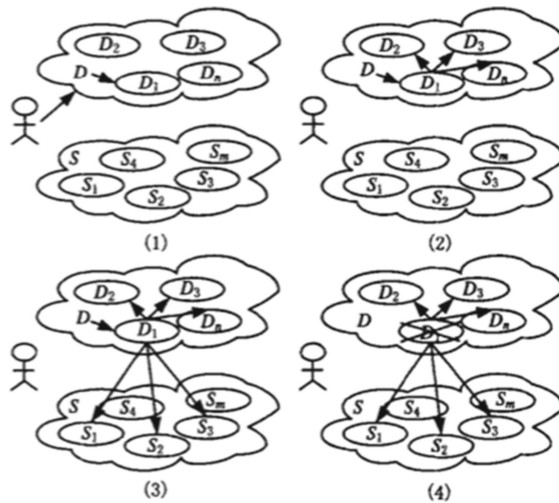


Fig. 3. Struts frame structure

Decision task submission and decomposition model of cloud storage in order to verify the construction method and related construction technology of decision support system based on cloud service proposed in this paper, with the support of the National 863 plan, the Key Laboratory of modern design and integrated manufacturing technology of the Ministry of education of Northwest University of technology, based on the

research in related fields such as networked manufacturing, knowledge management and decision grid, combined with the preliminary research results of the author's team, Taking a university in Guangdong as the service object, this paper preliminarily designs the education management decision support system model of cloud storage technology. The decision support system platform based on cloud service provided by the platform mainly includes four subsystems, namely virtualization support subsystem, cloud service management subsystem, knowledge base management subsystem and complex product design subsystem based on cloud service.

4 Conclusion

From the basic idea and technical framework of decision support system based on cloud service, combined with cloud storage technology and semantic rich cloud service, this paper discusses and studies the model of education management decision support system based on cloud storage technology. Compared with the traditional decision model, the introduction of cloud service concept and semantic technology has brought many new characteristics to the decision support system, such as intelligent service matching and model mapping algorithm, systematic networked manufacturing service mode, distributed, real-time and dynamic service composition, which effectively strengthens the decision-making ability of decision-makers when solving complex problems.

The most fundamental factor leading to the chaos of competition in the cloud storage industry is the confusion of the profit model. Cloud storage is a large market and a market with great potential. It can be said that whoever wins cloud storage will win the future. In order to attract more users, cloud storage service providers must provide more free storage space. However, as the storage space increases, the number of users paying for upgrades will decrease. Some small service providers without other sources of income are bound to be unable to bear such a large investment, and they have to find other sources of revenue. As an enterprise, SSP's ultimate goal is to make money, while customers want to get more, better, cheaper and even free services. At present, enterprises can only increase advertising and reduce the burden on users. As for other value-added services, they are still in the development stage and can not find a better way out for the time being.

Natural disasters such as tsunamis and earthquakes or human factors such as war will bring many uncertain factors to the development of cloud storage. Although there is no need to worry too much about human factors such as war in China, the review in all aspects and the shielding of some sensitive content also increase the time cost and uncertainty of cloud storage.

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