

# *A Study on the Management System of University Assets Based on Service*

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**Abstract:** With the continuous expansion of college assets, college assets management policies and systems are being strengthened and improved. At present, the state has successively promulgated a series of policies and systems on the assets management of colleges and universities, such as the Measures for the Administration of State-owned Assets of Administrative Institutions and the Interim Measures for the Administration of State-owned Assets of Central Administrative Institutions, so as to further regulate the assets management of colleges and universities. However, due to the technical dependence and functional design of college assets management system, the current college assets management system is difficult to adapt to the new situation. After deeply analyzing and studying the existing college assets management system, a college assets management system based on cloud environment is proposed. The system understands business from the service point of view and applies it to policy. At the same time, in order to improve the readability of the policy, the system also designed a relatively independent, suitable for business and policy application services.

## **1. Introduction**

Since the 18th National Congress of China, the national investment in education funds has increased by no less than 4 per cent of gross domestic product (GDP) for ten consecutive years. In 2021, the total investment in national education funds reached 578.767 billion yuan, an increase of 9.13% over the previous year. The steady increase in investment has greatly improved the conditions for various types of education at all levels, and has also accumulated a huge amount of state-owned assets while promoting the development of China's education cause, especially higher education cause. According to the statistics of the assets of higher education of the Ministry of Education, the total value of fixed assets of higher education in China exceeded 2737.4 billion yuan in 2022 [1]. How to manage the state-owned assets of this trillion scale and promote the high-quality development of higher education in China has become a huge challenge faced by various colleges and universities. The traditional asset management mode of colleges and universities can not meet the needs of large-scale asset management, nor can it provide flexible and agile asset allocation mode, which seriously restricts the effective improvement of asset use benefits. By analyzing the current university asset management system and combining with the concept of management as service, this paper puts

forward a service-based asset management system model, takes service as the bridge between management business and software system, and expounds the possible application scenario of this system model, which provides ideas and reference for the informatization construction of university asset management [2].

## **2. Analysis on the Current Situation of Asset Management System in Colleges and Universities**

In order to avoid unnecessary resource waste, this study aims to explore effective methods for evaluating and managing evaluation requirements. The results indicate that many universities and colleges choose to entrust the evaluation process to independent information system providers in situations where evaluation and management require significant resources. However, for independent information system providers, this is not the same type of task, i.e. different evaluation criteria are not required during the evaluation process.

At this point in time, consistent with the level of technical capability, information systems play a crucial role in the evaluation process. In addition, research has found that during this period, information systems played an important role in the evaluation process. In addition, there is evidence to suggest that in addition to evaluation, information systems also involve other evaluation criteria. Therefore, overall, there was a clear trend during this study period: a decrease in the number of independent information system providers, an improvement in quality, and an expansion in scope.

### **2.1. Lack of overall planning for system construction**

According to the requirements of the Ministry of Education for establishing the state-owned assets management mechanism of "unified leadership, centralized management, hierarchical responsibility, and responsibility to people", all colleges and universities have established full-time departments for state-owned assets management to be responsible for the unified management of state-owned assets in schools. However, because the management of state-owned assets in colleges and universities involves many aspects such as real estate, housing, infrastructure engineering, laboratory management, equipment management, and government procurement, when dividing the business, they belong to different management departments or divisions due to different management modes and concepts of colleges and universities [3]. This leads to the early stage of asset management informatization construction, lack of overall planning, the informatization construction of all departments "fragmented", each department has its own management system, forming a "chimney" island system. How to deal with these legacy systems is to achieve the five unified objectives of asset management, and must face and need to solve the problem.

### **2.2. There is no uniform standard for basic data**

This "chimney" system not only has great differences in software architecture and communication protocol, but also is difficult to integrate, and because the basic data standards of each system are not uniform, it is difficult to realize interaction and sharing. Taking real estate data as an example, the related businesses involve multiple aspects such as allocation of housing resources, leasing and lending matters, fixed asset management, and laboratory management, which are usually attributed to different management departments. In order to facilitate the management and statistical work, all departments have independent systems or ledgers, which are different in designing the data format of real estate, resulting in multiple different names or numbers of the same real estate. In the early development of information technology construction, this kind of "chimney" system satisfies the demand of "block" management mode to a certain extent, but when adapting to the new requirements of large asset management concept and supervision, this kind of "block" longitudinal management

mode appears powerless.

### **2.3. There is a gap between system functions and business needs**

Functional design adapts to business needs and is the key to system construction. Existing asset management systems in the system function design, more from the IT point of view to consider the data addition and deletion check and change, and lack of direct presentation of the function in the form of business [4]. This gap between system function and business needs is mainly manifested in two aspects: on the one hand, system function can not adapt to asset management business needs. That is, when asset management business changes, the system function is difficult to adjust in time and lack flexibility; on the other hand, the system function experience is difficult to meet customer needs. As the asset manager of system user, it is necessary to consider what function (usually query operation under different conditions) is used to complete the business when dealing with the business. At the same time, because the system function has no deep business operation, it may bring about the problem of unfriendly interface design. For example, interface display settings, content inheritance, and other aspects may not be concise and convenient enough.

## **3. Service-based asset management system for colleges and universities**

In order to solve the shortcomings of the existing university asset management system and meet the new requirements of university asset supervision under the new situation, this paper intends to integrate policy, business and IT from the perspective of service, so that asset managers, asset users and IT technicians can effectively communicate through the bridge of "service", and then improve the use efficiency of the system. The development of service-oriented architecture and cloud computing technology provides good technical support for our design and deployment of service-based asset management system platforms [5].

### **3.1. Service design in the asset management system of colleges and universities**

In the existing university asset management system, the matching between asset management business and IT system function is not strong enough, and the reason lies in the lack of communication and cooperation between the two bridge business and IT communication bridge. Because they came from two different worlds, the way they looked at the world and the "language" used were not the same. At the same time, due to the strong policy of asset management in colleges and universities, it puts forward higher requirements for the agility of management business, that is, it requires that the business process can be quickly reorganized or rearranged to keep up with the pace of policies [6]. Traditional function-driven IT systems are difficult to adapt to this flexible and variable demand due to technology and platform dependence. In view of this, this paper suggests that the design idea of university asset management system should change from traditional function-based mode to service-based mode in cloud environment. The former is a single terminal application mode of non-independent module combination and platform-dependent platform, while the latter is a relatively independent and freely combinable service application mode under multiple cloud terminals.

Based on the above considerations, we propose three levels of system service development from the perspective of service applicants:

**Asset user service:** The services provided to meet the needs of the majority of teachers and students in colleges and universities for the use of assets, including asset information inquiry, change, warehousing, adjustment, sharing and other daily management services of assets.

**Asset manager services:** Services provided to achieve the asset management objectives of school functional departments, including but not limited to user management (personnel and units), business

approval, process arrangement, department information interaction, reporting, compliance and other services.

System operator service: The service provided to maintain the stability, security and flexibility of system, involving such services as service update, basic data adjustment, service integration, interaction and feedback, system security and compliance.

### 3.2. Architecture of asset management system of colleges and universities based on services

Aiming at the problems mentioned above in current university asset management system, this paper designs a service-based university asset management system model in cloud environment. As shown in Figure 1, the model integrates hardware resources, network resources and data resources into a unified shared infrastructure layer and provides an open standard interface for upper service platform development and integrated application services. The development of services is accomplished by business driven and policy driven together, and then through the SOA integration bus, the relevant services are arranged and integrated into specific asset management services to provide services for end users.

A Service Based Asset Management System in Colleges and Universities	User Server	Information Services Personal assets Dispensing Asset Shared Assets	Business Request Dispensing Request Change Request Sharing Request	Terminal Access Mobile terminal Self-Service Terminal PC Terminal	Data Visualization	Cloud Security System of University Asset Management System
	Business Application Layer	Application Integration SOA Bus UDDI Service Deployment Service Call	Business Application User Management Approval Review Information Interactions Reporting Services	Terminal Management Capacity Assessment Fault Monitoring AUTHORITY CERTIFICATION Human-machine interface	Data Processing Center Base Data Generation Query Data Processing Request Data Processing Publish Data Processing Reporting Data Processing Accounting data processing Data compliance handling User Data Processing	
	Platform Service Desk	Development Environment Operating System Database Programming Environment APIs	Business Process Business Logic Process Arrangement Business Generation Business Management	Service Management Service Model Service Development Service Testing Service Encapsulation	Data source In-out check-in Business Operations Log Digital Credential Policy Regulations	
	Infrastructure Layer	Hardware Facilities Server Disk Array Access devices Network	Virtualization Virtualization Calculation Virtualization Storage Virtualization Network	Resource Management Data Management Virtual Management Cluster Management Balanced load		
University Asset Management System Cloud				University Asset Big Data		

The following describes the system model from three aspects: system IT architecture, business service and information flow.

Figure 1: Model of Service-Based Asset Management System in Colleges and Universities

#### 3.2.1. Schema of system IT

System IT architecture refers to all the different elements that constitute the organizational

information system and their association. A complete system IT architecture is usually composed of three parts: technical architecture, application architecture and data architecture. Among them, the technical architecture is a description of the logical software and hardware capabilities required to support business, data and application services, the application architecture provides business functions and manages data assets, and the data architecture is a description of the structure and interaction of the organization 's main data types and sources [7]. From IT infrastructure to client, this paper constructs a four-tier architecture model of university asset management system. First, from hardware deployment, the centralized deployment and management of cloud infrastructure meets the intensive requirements of system construction. Second, from the perspective of manufacturers, the cost of operation and maintenance management has been significantly reduced. After technicians redeploy the service in the cloud, end-users can download updates only, which greatly reduces the workload of operation and maintenance management. Third, the design of relatively independent and standardized services is conducive to interaction with external financial, personnel and other systems, and helps to improve the overall informatization management level of colleges and universities. Finally, the system model brings good extensibility and maintainability to the end users. Only through the administrator authorization, you can provide the corresponding asset management services for the units and personnel in need.

### **3.2.2. Business services**

In order to realize the goal of asset management in colleges and universities and promote the high-quality development of education undertakings in colleges and universities, it is necessary not only to rapidly adjust and reorganize the asset management business, but also to provide support for IT services adapted to this business change. The model of asset management system based on service provides a good operation mode for mutual drive of asset management business and IT service. On the one hand, it strengthens mutual understanding between asset management and IT manufacturers. For asset management departments, business or business processes correspond to services or service processes; for IT vendors, application or application collections match service or service processes, both of which gain understanding and consensus at the "service" level. On the other hand, it is more adapted to the needs of asset management business development and change. Because of its short development cycle, rapid deployment and easy maintenance, standardized application services provide good support for the rapid expansion of asset management business; on the other hand, through standardized service interface, services can be quickly combined and integrated, making the adjustment and reorganization of asset management business possible. In general, the agility of asset management business is greatly improved by organizing IT systems with service-centered rather than application-centered.

### **3.2.3. Information flow**

Big data of assets in colleges and universities is the basis of asset management business operation, and the information flow of data processing reflects the asset management business process, which is the description of the same thing in two different fields: business and IT. First, the acquisition of data is the premise and basis for the operation of asset management business. Data sources herein refer to but not limited to: the basic data of assets registered in and out of warehouse, business operation records or logs, digital certificates used for business application or approval, asset management policies and regulations and other data. These data provide the most basic support for the development of asset management operations. Second, data processing is the core of supporting the operation of asset management business, data operation is the main means to realize asset management business. Third, standardization and centralized deployment of data are conducive to the construction of unified

asset management services [8]. This mainly refers to the standardization of asset base data and centralized deployment in the system cloud infrastructure layer, so that different users and terminals will use the same asset base data, avoiding the data differences caused by the system version and other reasons. At the same time, centralized and unified deployment of basic data is also conducive to data update maintenance, end-user data will be automatically updated with the system infrastructure layer of data update.

### **3.3. Issues requiring attention in the development of asset management systems in colleges and universities**

In this paper, the advantages of the service-based asset management system in colleges and universities are emphasized, and at least the following two aspects need to be considered in practical development and application deployment:

#### **3.3.1. Safety**

The security of asset management system in colleges and universities should be considered from the following aspects: first, the security of basic hardware, all hardware deployed in the system must meet the relevant standards and requirements of the state and industry; second, the security of information transmission network, especially when the smart campus network communicates with the Internet, it is necessary not only to physically protect through hardware facilities, but also to control the transmission through the software system to prevent network invasion and attack from the outside; third, the security of data storage management, mainly to prevent the accidental loss or damage of data, in terms of disaster recovery backup, even if it cannot reach the "two centers" architecture of large-scale organization IT system (i.e., production data center, the same city disaster preparation center, different disaster preparation center), at least to realize the redundant backup of key equipment and synchronous backup of key data; fourth, the security of application services, that is, the security of system access, not only to ensure the reliability of user identity certification, but also to manage the operation rights of different users.

#### **3.3.2. Performance requirements**

The aim of constructing university asset management system is to realize the agility of asset management service through faster and more flexible IT application service. However, excellent system performance requires powerful hardware facilities, which often means high investment. If there is no reasonable evaluation of asset management business volume, then in the construction of the system, it may face two adverse scenarios: first, the system is strong, weak business, that is, the system capacity far exceeds the business needs, which often causes waste of resources; second, the system is weak, strong business, resulting in insufficient system support business, affecting the normal development of business. Therefore, when constructing the system, it is necessary not only to meet the current business needs, but also to leave appropriate development space, which requires accurate evaluation of asset management business volume and data flow. Evaluate to determine the network bandwidth, storage performance, capacity size and other performance indicators of the system, and then select the appropriate hardware infrastructure, so as to achieve a higher cost performance in the construction of the system [9].

## **4. Service Application Scenario in Asset Management of Colleges and Universities**

The main advantage of service-based asset management system lies in its flexible and efficient service application. Below we envision several different levels of application scenarios to illustrate

the adaptability of services.

Scenario 1: Daily management services for asset users. As the main service object of asset managers, asset users generate most of the daily asset management business. Taking the change business of asset users as an example, the existing asset management system only lists the assets under the name of the user when providing the change business function, but does not provide the source of various assets, especially for some assets with a large number and long years, it is difficult for the user to completely settle the assets. The service-based asset management system proposed in this paper can reorganize the asset inquiry service and asset change information service, and provide all asset change and source information under the name of the user, including but not limited to the time and cause of change, the time and project of purchase, which helps the user to trace back the specific circumstances of various assets, so as to successfully complete the asset change and handover.

Scenario 2: Policy update services for asset managers. The updating and adjustment of asset management policies and the perfection and perfection of rules and regulations are the pressures and challenges faced by asset management in colleges and universities. A policy release often requires hundreds of thousands or even millions of asset data to be updated and adjusted. In 2018, the Ministry of Finance formulated the Supplementary Provisions on the Implementation of the Government Accounting System by Institutions of Higher Education — Accounting Accounts and Statements of Administrative Institutions, which standardize the depreciation years of various fixed assets in colleges and universities. In order to adapt to policy adjustment, colleges and universities need to reset the depreciation years of all fixed assets in colleges and universities. This reset is not a static reset, but a dynamic adjustment. Existing asset management systems cannot be directly reset due to different classification options (some are classified by the Ministry of Education and some are classified by national standards) at the time of depreciation. In the service-based asset management system, the existing asset classification correspondence can be directly updated with the classification correspondence services in the policy service database (the services corresponding to different classifications according to the relevant provisions, and if there is no service database, it can be rapidly developed according to the policy), and then the depreciation life of fixed assets can be reset to meet the new requirements of depreciation policy.

Scenario 3: Joint reporting services with financial systems. Reporting is a routine statistical work of asset management in colleges and universities, and various types of reporting usually involve finance, teaching affairs, development planning, infrastructure, logistics and other departments. Taking the annual report of assets as an example, the annual report of assets in colleges and universities shall be consistent with the annual financial report. However, in the specific work, due to the connection between assets and finance is not very perfect, and due to statistical interval differences and historical account legacy and other problems, there are some deviations in the annual report work of the two systems [10]. In order to solve this problem, information exchange application service is specially set up in the service-based asset management system to realize the information exchange and sharing with finance, teaching affairs and human resources departments, so as to solve the problem of inconsistent information existing in departmental joint statements.

## 5. Conclusion

After a long period of investment and construction, especially since the 18th National Congress of China to education a large number of financial support, China's higher education "background" is more and more earnest. The emphasis of asset management in colleges and universities has gradually shifted from vigorous construction stage to refined management stage, and the evaluation of asset management in colleges and universities has gradually shifted from the index based on input quantity to the performance evaluation of input/output ratio. At the same time, at the policy and institutional

level, it also strengthens the norms of asset management in colleges and universities, and the realization of these management objectives requires efficient and flexible IT systems as support. The service-based asset management system in colleges and universities provides a solution for the application of cloud computing technology in the field of asset management, transforming the traditional asset management system that provides business functions as the main function into a system under the cloud computing environment that provides service development and application as the main function, and at the same time, integrating policy drivers into the asset management system to meet the new requirements of asset supervision under the new situation.

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