Application and Development of Cloud Computing Technology in the Field of Financial Management Informatization - based on Zhong tong Financial Cloud

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Abstract. According the development of digital technology, we are entering an era of digital economy now. Digital information technology has begun to penetrate social and economic life in an all-round way, becoming a new driving force for economic growth. With the development of the digital technologies , more and more enterprises have begun to embark on the road of digitalization. Cloud computing technology has the obvious advantage of being able to process and calculate massive data at high speed, and can also meet the needs of financial accounting management of units.

Keywords: Cloud Computing; Zhongtong Financial Cloud; Financial Management.

1. Introduction

Financial accounting occupies an important position in enterprise management, and management is mainly based on cost control such as personnel and equipment costs. The effective application of cloud computing services can effectively improve the economic benefits of enterprises and minimize operating costs. Cloud computing integrates various Internet technologies and information technologies. The effective application of cloud computing will have a certain impact on the realization of enterprise informatization. In the era of rapid industrial innovation in the new era, cloud computing has more advantages in terms of work efficiency and information security compared with traditional work modes, and enterprises need to focus more on financial accounting. With introduction of cloud computing technology, accounting activities are more important in fund management. The role in the distribution and distribution will be brought into full play, and the production activities of enterprises will be scientifically adjusted.

1.1 The origin of cloud computing

The concept of clould computing can be traced back to 1960s while internet was invented, when the Internet was using for sending email in the military, enterprises and more large organization, till the early 1990s, when the commercial network Connectivity to the enterprise Symbolizes the beginning of transiting to the modern Internet, and has continued to exponentially grow as the cloud computing technology On August 9, 2006, Google CEO Eric Schmidt first proposed the concept of cloud computing at the Search Engine Conference, which was also the first time in the history of cloud computing that this concept was formally proposed. Through the recent years, cloud computing has become the foundation for delivering mobile and content services, replacing traditional enterprise computing environments. The cloud will continue to play a larger or dominant role as businesses move to a digital-first economy. For instance, every business needs to informatize data and store relevant operational data, which use computer for data management, for a lot of enterprises, single computer does not provide enough computing power to satisfy their data computing needs, so they will have to purchase multiple servers and build data center with serveral servers, also the number of servers affects the processing capacity of the data center, so amount of purchasing would not be little. In addition to the high cost, the expansive electricity bill, the computer operating costs. So, the concept of cloud computing was developed. And one of the biggest advantages of cloud computing is that it can help them to avoid the cost of owning their own serfer, but instead just pay for the service what they use [1].

1.2 Concept of cloud computing

To put it simply, cloud computing is a pool full of resource. Which means it includes a lot of computing resources on the cloud, network resources, storage resources, etc., which are implemented and managed by dedicated software without manual participation. No need to worry about cumbersome details, users can realize remote operations through user terminals under network conditions, retrieve all the information in cloud storage, let them focus more on their own business, thereby improving efficiency and reducing costs. The essence of cloud computing is the ability to put computing resources on the cloud to coordinate together. By using this technique, thousands of pieces of data can be processed in a short time. It allows users gain unlimited resources on the network and will not limited by time or position. Cloud computing supports a large number of services. For example, the most direct various cloud disk services or cloud backup of photos on smartphones, or online services such as emails saendings, documents editing, viewing movies and so on, cloud computing allows it all this goes behind the scenes. Although the first generation of cloud computing services only have a history about ten years, in the past decades, cloud computing has achieved rapid development changes. There are already a variety of companies, government or another massive organization that adoptes this technology for a plenty of reasons.

1.2.1 Types of cloud computing services

Cloud computing has three main service types base on different level of service, they are: infrastructure as a service (laas), platform as a service (paas), and software as a service (saas).

(1) Infrastructure as a Service (IaaS)

IaaS is the most common cloud service, it provides virtualized computing resources like virtual machines, and provides to individuals or organizations. Allows users to rent IT infrastructure from cloud providers on a pay-as-you-go basis, which is attractive for companies that is interested to build an application and want to control all the resources themselves, but at the same time, the Companies are required to have technical skills to orchestrate services at that level. servers, storage, software and also hiring IT staff is what businesses have to invest in to build Data centers that is able meet peak demand.

(2) Platform as a Service (paas)

paas is a platform for developers to build applications and services through the internet. Paas provides an on-demand development environment, with the resources needed to transfer everything from simple cloud-based applications to complex cloud-enabled enterprise applications. Purchase the resources users need from cloud service providers and access them over a secure connection. PaaS includes infrastructure and middleware, development tools, business intelligence services and more.The entire application lifecycle to build, test, deploy, manage and update is what PaaS is designed to support for.

(3) Software as a Service (SaaS)

A SaaS model enable users to access application software and databases. In this case, install and run application software on the cloud, and help manage the infrastructure and platforms on which applications runs is the responsibility of the cloud providers, this service is oftenly priced on a pay-as-you-go or subscription basis. Cloud users have no control over the cloud infrastructure and platforms on which their applications run. This simplifies maintenance and support by eliminating the need for cloud users to run applications on their pc. in terms of scalability the saaS differ from other applications. The Scalability is implemented by replicating tasks to serveral virtual machines at runtime to meet changing demands. A load balancer distributes work between a bunch of virtual machines. Cloud users who only see one access point can see the process as it is transparent [2].

1.2.2 Types of cloud computing platforms

Public clouds are computing services provided by third-party providers over the public internet, and it is available to anyone who is wants to use or buy them. They can be sold for free or on demand, and customers only need to pay for the CPU cycles, storage, or bandwidth used.

A private cloud is a computing service that is provided only to specific users through a networked or private internal network. Provides enterprises with many of the benefits of public cloud, like scalability, and elasticity, from locally hosted computing infrastructure at the expense of dedicated resources and customization. In addition, private clouds provide higher levels of security and privacy through corporate firewalls and on-premises hosting, preventing third-party providers from accessing private data.

A hybrid cloud is a computing environment that combines private and public clouds, allowing data and applications to be shared between them. Use multiple public clouds [3].

2. The significance of cloud computing in the field of financial management

2.1 Positive meaning

In the development of an enterprise, financial accounting activities are very important, and its development determines the development direction of the enterprise's economy and the ability of sustainable development. Accounting informatization is a product under the background of the rapid development of information technology. Accounting also adopts the method of combining with information technology to improve the quality and efficiency of accounting business. Cloud computing technology has obvious advantages, which can realize high-speed processing of a lot of data, and apply it to enterprise-level accounting management, which can promote the informatization of accounting management.

2.1.1 Enables information exchange and timely feedback on issues

With the increasing pressure of market competition, enterprises must adapt to the market and improve management level and efficiency if they want to develop better and faster. Therefore, higher requirements are put forward for financial management. Using cloud technology to informatize the financial accounting of enterprises can effectively reduce capital management costs and improve informatization efficiency. With the help of the Internet system, accountants can concentrate all their work energy on in business, to achieve the purpose of improving work efficiency. In financial management and accounting business, employees can enjoy the service content provided by cloud computing through browsers, and cloud services provide accountants with professional accounting information services, making the work of accountants more flexible and convenient. Effectively integrated daily management operations of the enterprise include purchasing department, financial department, business department, production department, etc., promote good communication and centralize processing and analysis of capital flow information, timely feedback financial workflow problems, and help each department adjust work plans in a timely manner , The stability of financial work improves emergency response capabilities and improves the work coordination efficiency of various departments [4].

2.1.2 Reduce the cost

Financial management is an important part of the day-to-day management of an enterprise. Management is mainly based on cost control, including labor costs, equipment costs, etc. The use of cloud technology to informatize the financial accounting of some enterprises can effectively reduce the cost of enterprise capital management and improve the efficiency of informatization. First of all, in terms of personnel, information management itself uses computer technology to speed up operations, reduce labor costs, and bring results. Enterprise cost Economic burden cost mainly includes research cost and equipment cost. At the same time, system upgrades and system maintenance will also generate certain costs, which will bring financial burdens to enterprises, and many enterprises may even struggle to build financial accounting information systems. This application of cloud services further integrates the needs of financial accounting management information processing, reduces manual links, and encourages accountants to concentrate all work on business, so as to improve work efficiency. Through the browser, employees can enjoy the service

content provided by cloud computing, and financial managers can also share multiple financial management projects [5].

2.1.3 Data Support

Using Backup data everyday often requires during using traditional accounting software,But when it comes to clould services all of the data on the cloud computing system is real-time and generally does not need to be backed up. Cloud computing systems maintain the same full audit trail as traditional accounting software, so if errors are made and discovered, they can be corrected with reverse entries. In addition, cloud computing-based financial accounting informatization advocates the digitization of corporate capital flow, product transportation and other decision-making, how funds are allocated, how financial expenditures are recorded, how cloud technology supports accurate analysis, how to reduce corporate costs and enable financial accounting. Enabling accounting activities helps businesses maximize profits and alleviate financial problems caused by emergencies.

2.2 Security

Financial information security is the focus of enterprise financial management, which the sustainable development of the enterprise is related to it. Therefore, ensuring the security of financial accounting information can guarantee the daily financial management of the enterprise to a certain extent. However, information technology has a certain degree of openness. Financial data is stored in the server group in the cloud, and the service group exists independently. Although storage and export are convenient, if the enterprise's early warning mechanism is not perfect, encryption or monitoring is not strict, and then hackers will appear. Therefore, the security risks of computer information technology have a profound impact on the security of cloud computing, and will affect the rapid development of cloud computing security. For example, translators working under non-disclosure agreements may have problems with unencrypted sensitive data. And expose confidential information to outsider or even cloud computing personnel, or some service providers always have access to data in the cloud. And information may be changed or deleted unintentionally or on purpose. Same cloud providers is allows share information with others without permission from the coustumer. This is permitted by the Privacy Policy and consent is required to start using the cloud service. Of course, users can also prevent unauthorized access by encrypt data processed stored in the cloud.

In addition, cloud computing cannot completely prevent the lack of security awareness of the internal staff of the enterprise. The accounting staff are the main participants of the enterprise. There is a close connection between the financial management effect and the accounting staff, and the security awareness of the accounting staff will directly affect the When it comes to the security of accounting information, if the safety consciousness of the staff is not high, or the informatization is not fully understood, and the initiative in security management is lacking, it will also lead to the frequent loss of important accounting information and have serious consequences [6].

From the perspective of financial management and operation, some enterprises have recognized the value of cloud computing applications and began to apply cloud computing, but they are still in their infancy, and various technologies are still in their infancy and immature stages, which limits the level of financial informatization. To improve construction, the service forms provided by cloud computing service providers are too simple, the functions of information service software are relatively simple, various technologies are immature, and there are limitations in improving the level of financial informatization construction. In addition, cloud computing services are not comprehensive enough, and financial and technical constraints limit the scope of services that can currently be provided. In addition, many enterprises are not very mature in the application of cloud computing, which leads to various problems in the actual application process. Relevant statistics show that most domestic small enterprises are more active in choosing cloud computing platforms and services provided by domestic cloud computing service operators. Cloud computing comes from abroad. In this case, the research and development of domestic cloud computing is only financial management, and it is optimized to meet the financial management needs of enterprises, but when enterprises build financial accounting informatization, they cannot simply Relying on cloud

computing services, the existing cloud computing services cannot meet the needs of information construction, which is not conducive to the overall development. The effective integration and development of enterprises also improve the work efficiency of enterprise financial management. base from the current development situation, cloud computing is the main development direction in the future. To realize financial management and accounting informatization construction, enterprises need to improve the overall management and operation platform, and use cloud computing services to develop and improve. Promote enterprise diversification and achieve the purpose of informatization construction [7].

3. ZTE's application/development of cloud computing technology

3.1 Description

Zhongxing New Cloud Service Co., Ltd. (Zhongxing New Cloud for short) is a leading management consulting, information technology and knowledge service organization in the field of financial digitalization in China. As an innovative pioneer in China's financial digitization field, ZTE Cloud has externalized its knowledge and capabilities to provide enterprises with management consulting and Information Technology Solutions. So far, it has provided financial reform, financial sharing services and financial services for more than 200 large group companies and government-related institutions such as PetroChina, FAW Group, China Resources Group, China Tourism Group, China CITIC Bank, China Merchants Bank, China General Nuclear Power, and OCT. The overall solution of the information system leads the development of financial digitalization in China.

In 2005, due to the rapid expansion of ZTE's global business and the need for financial transformation in corporate strategy and business operations, ZTE Xinyun Financial Cloud Team was appointed to help ZTE to standardize and handle the financial operations of various business units, and received support. This established the first financial shared service center for Chinese enterprises.

In 2010, ZTE established a cloud computing center. When talking about the development trend of cloud computing technology, ZTE New Cloud Financial Cloud Team said that the shared service center is actually the integration of financial computing functions within the enterprise, which is very in line with the characteristics of cloud computing. Yes, on demand. Just like "stealth finance", it will respond in real time if there is a service request, even if you don't know where the service is and who is providing it.

Financial Cloud is a deep integration of shared service management models with new technologies, and interconnection with platforms such as business travel, banks, tax bureaus, and social networking, to promote the establishment of a "new ecosystem" in finance. Provide users with a full range of financial digital services out of the box. Finance Cloud pays more attention to the integration of business and finance, pays equal attention to management control and service, promotes the implementation of management accounting, builds financial big data, creates intelligent finance, and promotes the digital transformation of finance.

"Finance cloud" involves financial management, IT infrastructure, management software and many other fields. The process of introducing "financial cloud" for enterprises is also relatively complicated, and it is necessary to rely on an integrated system that can provide "management consulting + IT consulting + management software + other IT services". Solution vendor support.

"Finance Cloud" has evolved from the practice of financial shared services. It is not only an innovation of financial management mode, but also driven by the development of information technology. It has been given higher expectations and positioning, from the early "accounting factory" to "" Transformation and Development of Financial Big Data Center.

3.2 Application Status

The business-finance connection module covers the fields of employee reimbursement, purchase payment, sales collection, asset reimbursement, human compensation, etc. The module includes ticketing system, financial cloud applet, smart receipt box, procurement sharing-intelligent payable

cloud, procurement sharing-line The core systems such as the online procurement mall and revenue audit can intelligently collect front-end business information, help enterprises to connect with key stakeholders, and open up online channels for industry and financial data.

The financial control module mainly includes the contract settlement system and the budget control system. The two systems are connected with the reimbursement system, embedded management and control rules, standardize the management of enterprise contract execution, process control and post-event analysis of the budget, and ensure the standard and controllable business of the enterprise.

The shared core module includes electronic image system, electronic file system, intelligent collection system, intelligent audit system, shared operation system, and billing system. This module undertakes the data transmitted by the front-end system, processes and processes tasks, standardizes business processes and operations and records. The data generated by financial transactions is managed in a unified manner to promote enterprises to improve operational efficiency and quality, and to accumulate operational data and information.

The invoice tax module includes an output invoice management system, an invoice pool, and an input invoice authentication system. It provides enterprises with a full-process service guarantee from input management, output management to tax declaration, tax big data analysis and tax early warning, and efficiently supports corporate invoices. Manage and precipitate invoice value data

The accounting module mainly includes the accounting system, the consolidated report system and the shared operation system, which realizes the automation of accounting processing and intelligent accounting, and can generate account book reports under different calibers in real time.

The capital management module includes the bank-enterprise interconnection system and the capital management system. On the one hand, it connects with various banking systems to achieve bank-enterprise interconnection through system direct connection technology; Prevent financial risks.

The tax management module includes tax big data and tax early warning. Based on a unified tax information sharing platform, it establishes a full-life-cycle tax management system to provide full-process support and guarantee for input management, output management and tax declaration. At the same time, the tax data is integrated and precipitated to form the group's tax big data, which provides support for a more effective tax cycle and realizes the monitoring and early warning of tax risks.

The financial cloud map module can realize the visual display of massive data. It collects internal and external data of the enterprise, mines valuable information from the data, and combines big data analysis models and algorithms to provide support for enterprise data management, analysis, and application [8].

3.3 Construction of Core Functions of Financial Cloud

The financial cloud information system platform takes the data center as the core of enterprise data application, and has the characteristics of micro-service architecture, distributed management, and group cloudification. As the foundation supporting financial digitalization, the data center is the core of cloud technology in the financial field, and fully inherits the "cloud" design concept of sharing and reuse. The so-called middle platform is a public service platform that integrates enterprise-level resources, accumulates core functions, and shares data. By integrating reusable core business and data resources across different business units, enterprises can open up and lower the operation and management mode, form an intermediary platform, and realize service sharing, function reuse, data interoperability, and realization. Reduce build duplication and resource waste for core enterprise functions.

FOL financial cloud data center accurately stores enterprise operation and financial data, realizes data layering and horizontal separation, realizes cross-domain data integration and knowledge deposition through data modeling, provides data services, and provides data encapsulation and service release. With the support of the data center, the micro-service architecture, distributed management, and cloud-based architecture capabilities of the financial cloud information system can continue to release energy for the digital transformation of finance.

3.3.1 Microservice Architecture

Microservice is a design style of system architecture. The main purpose is to divide a huge, comprehensive and complex information system into several simple small services according to business modules. It is a lightweight system that can deploy databases by itself. Operate independently. The "micro" of microservices first means that their responsibilities are single enough and isolated from each other, and services communicate and collaborate through lightweight APIs to ensure that each service has excellent high availability. Second, it also means "trivial". It improves the risk defense performance of the system without affecting the entire system. Compared with the traditional information system service model, microservices have the following advantages: (1) Independent scalability. Each microservice can independently scale quickly horizontally or vertically as the business actually grows. (2) Can be upgraded independently. Each microservice can be independently upgraded and updated without relying on other services. Combined with continuous integration tools, it can be continuously released, allowing developers to quickly complete the service upgrade and release process independently. (3) High development efficiency. The code in each microservice only focuses on completing this single business category task, making the code more readable and improving the work efficiency of developers. (4) Language independence. The development language of each microservice may be different, and developers can choose their own technical route according to the business scenario. This way, microservices can respond faster when faced with new technologies or new framework choices. (5) Fault and resource isolation; if the system has bad resource operation behavior (memory leaks, database connections are not closed, etc.), only one microservice will be affected. Microservices only focus on one business, the code size is relatively small, and the startup speed is fast. (6) System architecture design based on native "cloud". Based on the design style of the microservice architecture, it is possible to build a native, very "cloud" friendly system, which is easily combined with popular container tools, connected to IaaS, and can build a continuous release system. A PaaS platform that can be easily deployed in a variety of "clouds".

FOL financial cloud information system adopts micro-service architecture to realize componentization and service. The system does not depend on other services and has independent scalability and upgradeability. Each functional module can be scaled and serviced horizontally and vertically according to actual business growth and actual demand changes. Updates and upgrades can be done independently. Continuous integration tools are used continuously. Developers can independently and quickly complete the service upgrade release process. At the same time, FOL also respects the historical investment of the enterprise, allowing new functional modules to be independently deployed on the basis of the existing system of the enterprise; each functional module can be combined with building blocks to adapt to financial development. Different industries and different scales; FOL's interface platform, all functional modules can be fully connected.

3.3.2 Decentralized management

The microservice architecture uses container tools such as Docker to isolate different functional modules of the financial system, install shortcut keys, and independently expand and upgrade the financial system through componentization and services. With the development and continuous development of enterprise business, the demand for financial services has skyrocketed, the scope of financial services has continued to expand, and the scale has gradually begun to disperse and expand, making comprehensive management and scheduling an urgent need. Faced with the new challenges of managing many containers, distributed management directly solves the scheduling and configuration problems of large-scale resources, and uses container orchestration and scheduling engines to create distributed and open build management. The global perspective network realizes the dynamic scheduling and configuration of physical and virtual resources scattered in different regions through the Internet, integrates the front and back ends of the application system, and realizes cross-platform and cross-database resource management. The characteristics of distributed management are: (1) Load balancing. The distributed management platform aggregates the service requests of all parties, monitors the resource throughput of each server in real time, dynamically

matches tasks and resources, realizes the optimal allocation of resources, and distributes the increase in load. (2) Elastic organization; Distributed management provides a microservice architecture and also has a lightweight, scalable and elastic mechanism. Distributed management platforms can also be easily deployed or decomposed as the number of microservice architectures changes. (3) The assignment is void. The distributed management platform can realize the state synchronization between various servers, and avoid the failure of user operations when a specific server is down.

The financial department is the data and information center of the enterprise. With the increase in the amount of data it holds, it will gradually become the big data center of the enterprise. digital process. As the dual-core engine of the distributed management platform, container tools such as Docker consider using container orchestration/scheduling tools to horizontally deploy transaction processing systems, accounting systems, configuration databases (organization codes, transaction categories, exchange rates, etc.) to perform load balancing to improve the financial system's performance. overall performance [8].

3.3.3 multi-cloud

In the traditional IT model, software applications are developed as a project, a codebase and a deployment file, limited to small software applications. The rapid development of the global economy has spawned many large and medium-sized group companies and multinational enterprises, and the demand is scattered, which will inevitably lead to the reconstruction and reorganization of the financial system. In order to achieve the purpose of unified planning and resource saving, the group can consider going to the cloud. Starting from the concept of resource-saving system construction, build a comprehensive financial management platform to help enterprises build the ability to build large-scale platforms, share infrastructure construction, and achieve infrastructure improvement [9].

4. Conclusion

In the future, cloud computing will become a new social productivity, cloud computing service providers will continue optimize services and technologies, and strive to make cloud computing services a social public foundation facility. Even in the context of cloud computing, the hidden dangers of data security cannot be completely eliminated, but there are still two ways to make the application of cloud computing in enterprises relatively safe and improve the security of cloud computing services. When enterprises apply cloud computing, data storage is one of the key factors affecting data security. Therefore, in the process of constructing accounting information, it is necessary to improve the security of cloud computing services. The first thing to do is to improve the technical level, increase the effective application of various security technologies, technically improve the reliability and security of cloud computing, especially data storage security, develop security software, improve security, and better protect and use accounting Information and Data Protocol. Protect all kinds of accounting information and data, and prevent hacker and virus attacks from affecting data security. The second is to change the mentality of choosing cloud computing service providers from the crowd. Enterprises should choose to cooperate with well-known large cloud platform service providers, conduct in-depth research on the information encryption and protection features of their products, and sign confidentiality agreements. Third, protect cloud computing services from the perspective of laws. The laws of cloud computing technology in my country are not mature enough to regulate cloud computing. It is very important to improve laws and regulations. Finally, establish a financial information early warning mechanism. Prevention in advance, monitoring during the event, timely handling after the event, insisting on irregular random inspections, and building and installing a dedicated internal shared network. Install anti-virus software and conventional anti-virus, set permissions, advanced login passwords, record passwords, save and backup data in time, etc., and continuously improve the data security factor [10].

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