

---

AI translation · View original & related papers at  
[chinaxiv.org/items/chinaxiv-202310.02869](https://chinaxiv.org/items/chinaxiv-202310.02869)

---

## Postprint: Research on Informatization Network Technology in the Context of Cloud Computing

**Authors:** Shang Yongqiang

**Date:** 2023-10-08T00:00:00+00:00

### Abstract

Science and technology continuously advance in adaptation to the social environment, while concurrently serving to improve it. Computer and network technologies have ushered society into the information age, rendering information technology an indispensable tool across various domains. The advent of cloud computing technology has catalyzed the development of modern information technology, not only accelerating information transmission but also enabling storage in virtual network databases, thereby allowing information sharing unconstrained by temporal and spatial limitations. The “Internet Plus” paradigm has made the Internet an integral component of application fields, and its virtual and open characteristics have propelled information-based network technology into novel research frontiers. Cloud computing network security has emerged as a subject of considerable contemporary concern. This paper investigates information-based network technology within the context of cloud computing.

### Full Text

## Research on Information Network Technology in the Context of Cloud Computing

### Abstract

Science and technology continuously adapt to and improve the social environment. Computer and network technologies have ushered society into the information age, making information technology an indispensable tool across various fields. The emergence of cloud computing has accelerated modern information technology development, not only increasing information transmission speed but also enabling storage in virtual network databases, allowing unrestricted information sharing across time and space. The “Internet Plus” initiative has made the internet integral to applications, and its virtual, open characteristics have

opened new research avenues for information network technology. Cloud computing network security has become a critical concern. This paper investigates information network technology against the backdrop of cloud computing.

**Keywords:** cloud computing; informatization; network technology

**Chinese Library Classification:** TP393.09

**Document Code:** A

**Article ID:** 1671-0134(2017)12-110-02

**DOI:** 10.19483/j.cnki.11-4653/n.2017.02.032

The widespread adoption of computer and network technologies has brought numerous conveniences to production and daily life. Networks have become vital tools for social development and an important indicator of societal progress. The advent of cloud computing marks a new developmental stage for computer network technology. Born from and dependent on networks, cloud computing must address information security issues inherent in network virtuality and openness. Only by ensuring effective cloud computing operation can network technologies be used securely.

## 1. Overview of Cloud Computing Technology

Cloud computing is a computing model built upon the internet. The “cloud” refers to computer clusters that perform computations centered on network resources. On internet platforms, computer browsers and operating systems are connected to the cloud, allowing computing resources to be utilized via cloud computing—this is the cloud terminal. Server clusters perform real-time information management for the cloud, with all these operations undertaken by cloud service providers to ensure normal service delivery.

## 2. Information Network Architecture in Cloud Computing Environment

The information network architecture in cloud computing environments includes four modules, detailed below.

### 2.2 Inter-VM Cloud Computing Network

Network connections between virtual machines enable inter-VM information access. Technically, this cloud computing network module is formed by building a software layer on virtual switches.

### 2.3 Inter-Server Cloud Computing Network

Traffic comprises two types: horizontal traffic generated between servers and vertical traffic from users accessing servers. Data centers employ distributed computing, primarily using horizontal traffic [1]. When virtual switching between

servers is completed, horizontal traffic migration enables the implementation of a two-tier network.

#### **2.4 Cloud Computing Network Between Users and Data Centers**

The module connecting users and data centers provides high practical value for cloud computing networks. User-data center connections are realized through metropolitan area networks. As cloud service deployment matures, data center deployment becomes centralized, generating substantial traffic during data exchange. This necessitates increased network bandwidth, enhanced intelligence, and richer network services. When migration occurs between data centers with temporal or content overlap, or when a service transitions across data centers, issues of data center selection and mutual switching must be addressed.

### **3. Information Security Measures**

#### **3.1 Building an Information Assurance System**

Under the cloud computing paradigm, constructing an information assurance system is essential for information security protection. In today's fiercely competitive internet industry market, operators employ proprietary information security platforms to prevent information leakage and enhance security. Many Chinese enterprises have adopted cloud computing technology, but inefficient utilization of cloud information has led to significant resource waste. Strengthening cooperation among operators to build a unified network information management platform is necessary to integrate multiple information sources and fully leverage cloud computing network advantages. On such platforms, operators can mutually enhance their technologies, ensuring a secure cloud computing network environment and safe operation of information networks.

#### **3.2 Rational Application of Encryption Technology**

All information in cloud computing networks should be encrypted. When information is transmitted online, specialized personnel encrypt it. Users can access information by logging into the cloud with correct passwords, ensuring information security. During transmission, information managers can set upload commands, and receivers follow these instructions to receive information, preventing transmission errors. In the cloud computing context, information is well-protected against malicious intrusion and damage. Multiple passwords can be set during transmission to effectively prevent hacker interception or tampering. When users process information on network platforms, disk operation termination may occur, and information deletion can lead to leakage. To prevent information loss, backup technology must be employed for information preservation [2].

### 3.3 Scientific Management of Cloud Computing Infrastructure

During basic network management, firewall technology must be continuously improved to prevent malicious URL fraud, with careful attention to firewall installation location. Cloud computing operating systems should be regularly inspected, with antivirus software installed as needed. Necessary protective measures must be implemented for cloud computing infrastructure during facility security management to ensure normal operation of the security system.

## 4. Information Network Technology Under Cloud Computing Background

Cloud computing technology employs two computing methods. The first is the “one-to-many” approach, where server virtualization improves resource utilization. The second is distributed computing or grid computing, connecting multiple servers to form a super server with powerful computing capabilities, enabling the completion of computing functions. Both methods enhance cloud computing utilization while imposing higher demands on network technology.

### 4.1 Increased Horizontal Traffic

Virtual machine migration technology facilitates server virtualization, while distributed computing improves server efficiency, significantly increasing horizontal traffic between servers. In data center operations, the traditional vertical traffic pattern has shifted to horizontal traffic, causing sudden increases that lead to network congestion. With growing information flow, bandwidth must increase and network latency must be continuously optimized.

### 4.2 Dynamic Migration of Virtual Machines

Dynamic VM migration involves moving virtual machines from one physical server to another while maintaining service quality. The key is optimizing migration methods to reduce migration and downtime duration [3]. Dynamic VM migration enhances data center functionality and flexibility, improving operational maintenance efficiency, strengthening disaster recovery backup capabilities, and saving energy while reducing emissions. Current VM dynamic migration technology typically maintains constant IP addresses during migration. In cross-domain scenarios, using physical routing achieves good migration effects. After migration, original network configurations may fail, preventing normal communication status with the outside world and compromising business continuity. This necessitates VM deployment in two-tier networks to satisfy cloud computing network operation.

### 4.3 Network Scale Development

As VM numbers increase, so do servers, driving network scale development. Two mitigation approaches are typically adopted to manage rapid network scaling:

three-tier network architecture or two-tier network construction. Compared to three-tier networks, two-tier networks enable faster internal data center traffic conversion and reduce networking costs as conversion efficiency improves. However, as networks scale, two-tier network reliability and scalability weaken, hindering effective cloud computing application [4]. In cloud computing contexts, information network technology must continuously upgrade, requiring two-tier networks to achieve high-efficiency non-convergence or low-convergence, improving network operation capabilities and increasing VM hosting scale. VM traffic must be monitored by network equipment, which should effectively support VM dynamic migration, extending two-tier networks across data centers.

## 5. Conclusion

In summary, as cloud computing technology finds widespread application across various fields, network technology must continuously upgrade to meet new information environment development requirements. Information technology construction must intensify network technology R&D from an application domain perspective, supporting and optimizing cloud computing technology to enable broader future development and better functional value.

## References

- [1] Di Hanwang, Zheng Yunfan, Lv Lin. Research on Personal Information Security Issues in New Media Communication in the Big Data Era: A Case Study of “Guangdong’s First Human Flesh Search Case” [J]. Western Radio and TV, 2015(12): 42-46.
- [2] Wang Xiaoyu, Cheng Lianglun. Research on Trusted Assurance Mechanisms for Multi-source Information Resource Cloud Service Models under Cloud Computing [J]. Application Research of Computers, 2014(09): 2741-2744, 2749.
- [3] Xu Lei, Zhang Yunyong, Wu Jun, et al. Research on Network Technology in Cloud Computing Environments [J]. Journal on Communications, 2012, 33(21): 216-221.
- [4] Liao Shuai. Research on Information Security Issues in Cloud Computing Network Environments: Cloud Computing Network Security Management in Libraries [J]. Electronic Technology & Software Engineering, 2016(14).

(Author Affiliation: Xinyang Agriculture and Forestry University)

*Note: Figure translations are in progress. See original paper for figures.*

*Source: ChinaXiv — Machine translation. Verify with original.*