Exploration of Cloud Storage Technology and Its Application in Television Stations: Postprint

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Abstract

Cloud storage is a product of cloud computing. With the advancement of modern information technology, cloud storage technology has been widely applied across various industries, capable of providing network services comparable to those of supercomputers. This paper first analyzes the system architecture and service offerings of cloud storage technology; then introduces the current application status and future prospects of this technology in cloud television and television stations; finally, it identifies security protection measures during application for reference.

Full Text

Cloud Storage Technology: An Exploration and Its Application in Television Stations

Abstract: Cloud storage represents a product of cloud computing. With advancements in modern information technology, cloud storage technology has achieved widespread application across various industries, delivering network services comparable to supercomputing capabilities. This paper first analyzes the system architecture and service offerings of cloud storage technology; it then examines the current application status and future prospects of this technology in cloud television and broadcasting stations; finally, it identifies essential security protection measures during implementation for reference purposes.

Keywords: cloud storage technology; cloud TV; television station; security protection

Cloud storage utilizes network technology, cluster applications, and distributed file systems to aggregate storage devices across networks, providing data storage and business access functions. Simply understood, it relocates database storage resources to the network cloud for user query and access, overcoming temporal and spatial limitations. Compared with traditional storage methods, cloud

storage technology offers superior portability, enabling users to enjoy services anywhere.

1.1 System Composition

The cloud storage system architecture comprises four distinct layers. First, the storage layer encompasses diverse storage devices, including Direct-Attached Storage (DAS), IP-based storage, and fiber channel storage devices. These devices, characterized by large quantities and broad geographic distribution, interconnect via internet or wide area networks to enable mutual communication. Second, the management layer serves as the core of cloud storage, utilizing grid computing and distributed file system technologies to ensure unified external services while enhancing data access security and efficiency. Third, the application interface layer offers the greatest flexibility, allowing television stations to develop customized application interfaces based on specific business requirements, thereby providing personalized services. Fourth, the access layer enables authorized users to log into the system through standard interfaces and access various cloud storage services. Notably, the application interfaces, access methods, and access types maintain consistency while allowing customization according to different user needs.

1.2 Service Content

The primary service functions include data storage and cloud transcoding. Regarding data storage, the fundamental capability involves storing data without the system interpreting its meaning or analyzing relationships between datasets. However, users must properly identify data objects when utilizing cloud storage technology. With rapid informationization, television stations generate massive video data daily; rather than constructing separate storage facilities, they can leverage internet-based storage clusters to achieve shared cloud storage services for efficient transmission, browsing, and downloading. For cloud transcoding, the system can transcode original video formats to meet diverse user viewing requirements.

2.1 Application Status

Cloud television represents the integration of the broadcasting industry with cloud storage technology, enabling users to access required television resources via internet technology. This convergence facilitates selective viewing and endows cloud storage applications with bidirectional interactive functions such as video-on-demand, information retrieval, gaming entertainment, and voice control. Current cloud television standards require: (1) a specialized operating system providing user-friendly interfaces, similar to Android, Windows, or iOS systems; (2) a cloud television platform offering private databases for storing user files including images, text, audio, and video, with capabilities for data invocation and management; (3) robust cloud application functions through intelligent human-computer interaction to enhance user experiences, such as voice calls, video calls, and live streaming; (4) rapid response speeds ensuring timely

and accurate service delivery; and (5) a multi-layered, open ecosystem as the fundamental guarantee for technology application.

2.2 Development Prospects

The future development trajectory encompasses three key directions. First, multi-screen convergence: under the triple-network integration context, terminal devices including tablets, mobile phones, and cloud televisions can achieve interconnectivity, breaking multi-screen barriers and optimizing user experience. Essentially, multi-screen convergence represents the integration and sharing of cloud and all-media resources, enabling features like app stores and online services on cloud televisions, facilitating synchronized display of text, video, and audio resources while allowing users to download applications according to actual needs. Second, multi-screen distribution: cloud televisions maintain constant internet connectivity when using video players to access cloud resources. Multi-screen distribution enables cloud television to meet the requirements of different playback devices and resolutions through automatic recognition and self-encoding, ensuring optimal clarity and resolution parameters. Third, social business: unlike traditional television, cloud television's key feature is enabling social services, allowing users to interact with others while watching programs through downloaded internet applications, such as creating video social software through direct interaction with smart terminals.

3.1 Application Status

Cloud storage technology addresses the common latency issues in remote or hosted storage operations by maintaining frequently used data locally through high-speed caching, ensuring data storage speed even during network interruptions or delays. Currently, cloud storage technology can emulate NAS gateway devices to provide remote data protection and enhance information security. In television station operations, applications include: (1) staff accessing cloud computing systems through different account credentials via cloud terminals to upload and manage personal information, providing independent storage space and preventing data loss; (2) network engineers backing up drivers and software to ensure system reliability while saving storage space; (3) journalists transmitting interview materials directly to cloud storage, replacing traditional USB or hard drive transfers to prevent virus intrusion and enable resource sharing; and (4) enabling staff to access files remotely instead of being limited to home or office computers, with features like automatic repair and multi-location backup.

3.2 Development Prospects

The integration of television stations and cloud storage technology involves establishing a comprehensive all-media business platform combining public and private clouds according to different requirements. This platform must satisfy three primary needs. First, storage resource requirements: online storage employs cluster NAS technology, configuring high-capacity, low-speed hard drives for high-bitrate media file storage and low-capacity, high-speed drives for retrieval-bitrate files. Additionally, object storage technology enables near-line

or offline storage through background migration archive servers for online and near-line migration. Second, network resource requirements: network architecture design should target large Layer-2 networks to ensure virtual machines can migrate arbitrarily within resource pools while preventing broadcast storm proliferation. Resource allocation should implement dynamic distribution and timely recovery of network resources, with reasonable convergence ratios to prevent business congestion. This requires aggregation switches with robust backup capabilities for engines and environmental components, controlling switchover time within two seconds and achieving single-device reliability above 99.999%. Third, computing resource requirements: the virtualization resource layer classifies and edits computer resources to support management and scheduling operations. The virtualized resource pool comprises platform blade servers requiring reasonable resource allocation to meet I/O throughput capacity, with configuration adjustments based on different business characteristics to improve resource utilization and reduce costs through proper planning of secure access and CPU performance.

4.1 Establishing Security Standards

As an important development trend in data storage, cloud storage technology currently lacks unified technical standards, with storage vulnerabilities and risks potentially compromising data security. Given that cloud storage data features large volumes and diverse types, users must select high-capacity, high-speed devices and perform regular upgrades and optimizations according to actual needs, while simultaneously establishing security standards to normalize and standardize management workflows.

4.2 Implementing Key Protection

Using encryption keys for stored data prevents unauthorized access, restricting data storage and retrieval while enabling data encryption as a critical security protection measure. Practice demonstrates that key protection enhances cloud storage platform security, reduces hacker or virus attacks, prevents data leakage, and safeguards the interests of users and service providers.

4.3 Introducing Video Monitoring

Video monitoring technology can authentically record events to support management operations. Applied during data entry and retrieval stages, it enables understanding of user or visitor behaviors to ensure data security. This requires administrators to enhance video monitoring capabilities from the perspectives of network smoothness and video players.

In summary, cloud storage systems consist of storage, management, application interface, and access layers, offering services including data storage and cloud transcoding. This paper details the current application status in cloud television and television stations, identifies future development prospects, and emphasizes that security measures including establishing security standards, implementing key protection, and introducing video monitoring can ensure stored

data security, warranting focused attention from administrators.

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