Technical Subject:

Implementation of Dependable Information Storage System

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Backgrounds and Research Goal:

Recently, the amount of information stored into a computer system increases rapidly. Technologies related to the storage devices have been tremendously improved to make the system capable of storing a large amount of data. Corresponding to the increase of storage capacity, the contents kept in the storage system are also growing very large. These contents including multimedia data should be accessed via networks. To handle highly frequent access requests, a cluster configuration of storage, such as the Storage Area Network (SAN), is essential. However, it is hard to say that current technologies of the storage cluster are sufficient. We need sophisticated functions for balancing the access load within the cluster and making it reliable. It means that dependable storage management is highly required. The goal of this research is to realize the highly dependable information storage system.

Approaches and Methods:

We have proposed *autonomous disks* to implement the dependable information storage system. It autonomously handles failures and load skews in the cluster by combining a distributed directory, stream interface and active rules with transaction mechanisms. The combination is also effective for cluster reconfiguration for removing damaged disks or adding new disks. These functions for balancing load, tolerating failures and reconfiguring the cluster are quite flexible and completely transparent to users of the cluster. These features greatly reduce the cost for managing information storage, which is currently a very serious problem of large storage systems.

We have proposed a distributed directory structure, rule descriptions and protocols to handle load balance, failures and reconfiguration of a cluster. We have also developed an experimental system, and evaluated basic functions and their performance. We are now in the stage of demonstrating the effectiveness of our approach by implementing a more practical system.

Relationship with the Session Theme:

Because information storage management is one of the most important functions for information system, its dependability tightly related to the dependability of the total information system.

Effects of the Research:

The influence of data loss and access performance for stored data is indescribably large in our daily life. Our research result would improve the dependability of the information system related to the actual life.