

DESIGN AND IMPLEMENTATION OF A SCALABLE AND SECURE NETWORK ATTACHED STORAGE SYSTEM

Abstract

In today's data-driven society, information must be securely preserved and retrieved efficiently. This project provides a Network Attached Storage (NAS) system intended to provide a reliable, scalable, and cost-effective data storage and administration solution. Utilizing computer engineering concepts, the NAS system integrates several storage disks into a single unit that can be accessed over a network, assuring data redundancy, security, and high availability.

The operating system is based on Debian and provides a solid foundation for storage drive management. The system uses RAID configurations to ensure fault tolerance and data integrity.

Gigabit Ethernet is used to create network connectivity, with up to 10 Gigabit Ethernet connections to meet increased capacity demands. The NAS system supports a variety of file-sharing protocols, including SMB/CIFS, NFS, and FTP, providing easy interaction with a wide range of operating systems, including Windows, Mac OS, and Linux. Support for AES-256 encryption improves security by preventing unwanted access to data at rest. To improve efficiency, the system uses caching and modern storage technologies such as LVM and filesystem snapshots. The system provides a full web-based GUI for easy configuration, maintenance, and real-time monitoring. This interface accepts plugin extensions, which provide extra features such as Docker containerization, and Rsync backup

This NAS project not only demonstrates technical skill in hardware and software integration, but it also solves practical data management requirements by delivering a diverse and dependable storage solution.

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