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## **ReTecNAS: Reviving Retired PCs for Affordable Personal NAS Servers**

*Pushpalata Verma<sup>1</sup>, Aarav Shukla<sup>2</sup>, Naveen Agrawal<sup>3</sup>, Akshat Chandrakar<sup>4</sup>, Naman Taunk<sup>5</sup>*

<sup>1</sup>Assistant Professor, Bhilai Institute of Technology, Raipur, Chhattisgarh, India

<sup>2,3,4,5</sup> Student, Bhilai Institute of Technology, Raipur, Chhattisgarh, India

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### **ABSTRACT**

This research explores repurposing retired PCs or laptops as a cost-effective, eco-conscious solution to meet escalating storage demands. Utilizing Network Attached Storage (NAS) principles and Open Media Vault, Docker & Portainer, and Nextcloud, we transform aging hardware into a versatile homebrew data storage server. Experimental results confirm its efficiency, offering enhanced data management, user-friendly configuration, and improved security. This approach not only addresses storage needs but also promotes sustainability by extending electronic device lifespan, providing an accessible and environmentally responsible solution in our digital era.

Keywords: NAS, Next Cloud, Open Media Vault, Retired Laptops

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### **Introduction**

Addressing the surging demand for personal data storage due to internet reliance, this study explores a novel solution—repurposing retired PCs or laptops into a homebrew NAS system. The aim is to determine if utilizing such hardware provides a practical, cost-effective, and eco-conscious solution. Integration of Open Media Vault, coupled with Docker and Portainer, enhances data management and security, facilitating Plex media and Nextcloud installation. Routers and LAN connections support network configuration. Experimental results affirm the viability of this approach, offering an efficient, recyclable solution that aligns with evolving demands for eco-friendly data storage in the digital era.

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### **Network Attached Storage (NAS):**

Network Attached Storage (NAS) is a specialized file storage system designed to provide shared data storage and retrieval services to multiple users and devices within a local-area network (LAN). Unlike traditional storage solutions where files are stored directly on individual devices, NAS operates as a centralized repository accessible over a standard Ethernet connection. It consists of dedicated hardware equipped with one or more hard drives and is designed to be an independent server optimized for efficient file sharing.

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### **Working of NAS**

Network Attached Storage (NAS) operates through a dedicated hardware setup connected to a local area network (LAN). The NAS device, equipped with one or more hard drives, runs its own specialized operating system with a management interface for configuration. Assigned an IP address on the network, the NAS supports file protocols like SMB and NFS, enabling seamless file access. User access and authentication mechanisms control permissions, facilitating collaborative file sharing. Remote access is supported securely through protocols like FTP or SSH. Some NAS devices implement RAID configurations for data redundancy, ensuring protection against drive failures. Built-in backup and synchronization features, along with scalability for expanding storage capacity, make NAS a versatile solution for centralized and accessible network storage.

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### **Technology Used**

This study leverages OpenMediaVault, Docker, and Portainer to repurpose retired PCs or laptops into a homebrew NAS system. OpenMediaVault forms the foundation, enhancing data management and security. Docker and Portainer facilitate seamless installation of Plex media server and Nextcloud. The incorporation of routers and LAN connections ensures network configuration. Experimental results confirm the practicality, cost-effectiveness, and environmental benefits of this approach. The technology stack employed not only transforms obsolete hardware into a versatile NAS but also aligns with the rising demand for eco-friendly data storage solutions in the digital era.

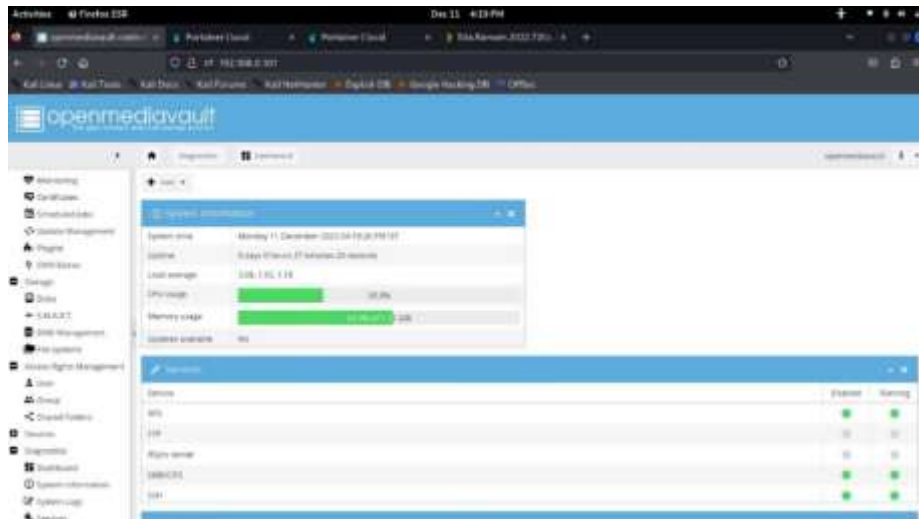


Fig. 1 Open Media Vault

## ReTecNAS Workflow

The process of creating a cost-effective Network-Attached Storage (NAS) solution is articulated through a structured workflow that begins with the identification and repurposing of retired PCs or laptops as the foundational hardware components. This initial phase strategically capitalizes on existing resources, thereby mitigating the need for additional expenditures and aligning with the overarching goal of cost-effectiveness. The emphasis on hardware repurposing serves as the cornerstone for a sustainable and economical approach to NAS implementation.

Central to this workflow is the pivotal selection of OpenMediaVault as the software solution for the NAS system. OpenMediaVault is chosen for its distinguished attributes, including robust data throughput and a user-friendly web interface. This careful software selection is a critical decision that contributes to the overall efficiency and accessibility of the NAS solution. The software acts as a unifying element, providing a cohesive platform for the integration of repurposed hardware.

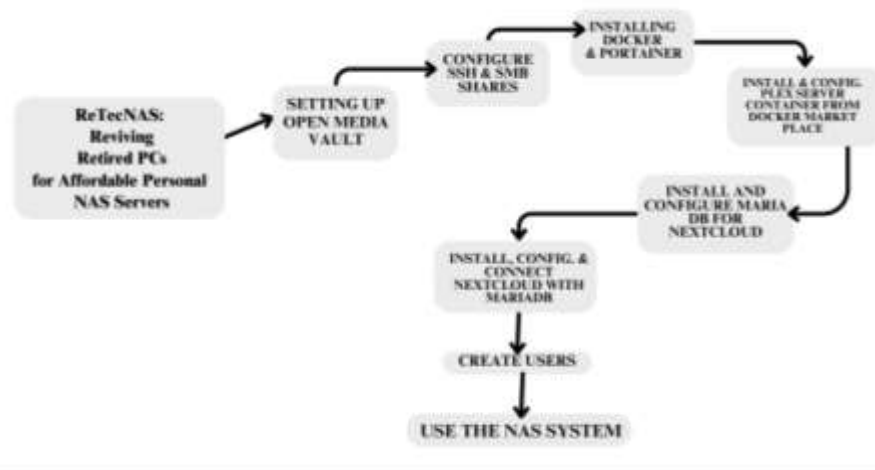


Fig. 2 Complete Work Flow

As the workflow progresses, it transitions into the configuration phase, characterized by minimal requirements designed to streamline the setup process. OpenMediaVault's inherent accessibility from any client within the network is leveraged during this phase, ensuring seamless user interaction. The emphasis on simplicity and efficiency underscores the user-friendly nature of the system, making it approachable for individuals with varying technical expertise.

The culmination of this workflow results in the realization of an efficient and affordable personal data storage server tailored specifically for home environments. The integration of repurposed hardware and the strategic alignment of OpenMediaVault software coalesce to form a cohesive, accessible, and budget-conscious NAS solution. The workflow, therefore, optimizes not only the repurposing of hardware but also strategically aligns software

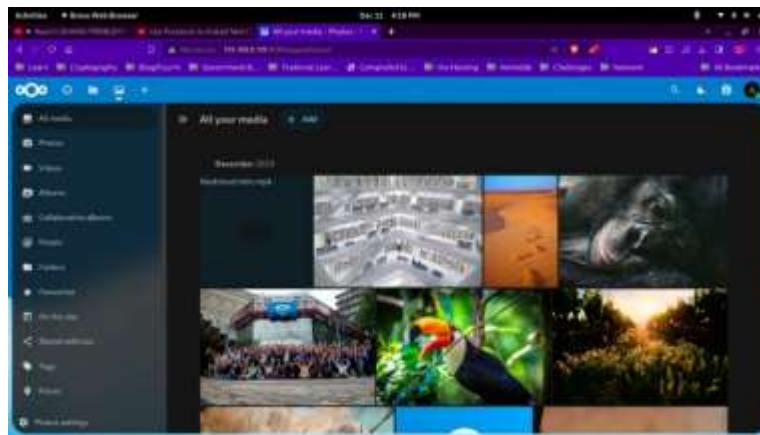
capabilities to deliver a comprehensive and cost-efficient storage solution. This systematic approach provides a clear path for individuals seeking to establish a NAS system that is both economical and effective for personal data storage needs in a home setting.

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## Result

Building a personal NAS with retired laptops or PCs emphasizes user privacy and control, providing complete oversight of sensitive data without reliance on third-party servers. This cost-effective DIY approach leverages existing hardware, resonating with budget-conscious users seeking economical personal data storage solutions. While the initial configuration demands some technical expertise, the hands-on "Build Your Own NAS" method empowers users to tailor their setup for optimal performance. Troubleshooting capabilities are enhanced, as users have complete control over hardware and software configurations, fostering a resilient and self-sufficient system.

To augment flexibility, external drives can be seamlessly integrated by adding a router to the system. This plug-and-play solution accommodates users looking to expand storage beyond the capabilities of retired laptops or PCs. Docker is introduced as a technology to boost NAS scalability through efficient containerization, allowing the integration of additional applications and services without compromising system stability. This scalable and adaptable approach caters to users with growing storage needs, ensuring the longevity and maintainability of the NAS setup.



*Fig. 3 Final NAS Storage System*

In addition to the technical advantages, the sustainability aspect of repurposing retired laptops or PCs aligns with eco-friendly practices by extending the lifespan of electronic devices. This approach contributes to a more environmentally conscious solution for personal data storage. In summary, the combination of repurposing hardware, a DIY NAS approach, external drive integration, and Docker for scalability offers a comprehensive, cost-effective, and sustainable solution for personal data storage needs. This approach adeptly addresses various considerations, including budget constraints, user privacy, technical control, troubleshooting capabilities, and scalability.

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## Conclusion

In response to the escalating demand for increased storage capacity driven by our internet-dependent lifestyles, this research paper explores the feasibility of repurposing retired PCs or laptops as the hardware foundation for a homebrew data storage server, harnessing Network Attached Storage (NAS) principles. The study's experimental findings conclusively demonstrate that utilizing retired PCs or laptops as NAS hardware presents a cost-effective, eco-conscious, and efficient solution for personal data storage needs.

By advocating the "Build Your Own NAS" approach, the study encourages individuals to construct their personal NAS systems using recycled laptops or PCs. This approach not only offers significant cost savings but also empowers users with complete control over their data and the ability to troubleshoot issues, prioritizing privacy and user agency.

Furthermore, the research introduces innovative methods to enhance NAS functionality, such as integrating external drives and incorporating Docker for scalability. These solutions cater to diverse user preferences and requirements. In conclusion, this research paper offers a versatile and accessible solution for individuals seeking economical and eco-friendly data storage in an increasingly digital world. Repurposing retired laptops or PCs for NAS, along with a DIY approach, integration with external drives, and the use of Docker for scalability, collectively provide a comprehensive response to the evolving needs of personal data storage.

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