NAS Project
(Network Attached Storage)

Introduction

The NAS (Network Attached Storage) project aims to create a centralized storage solution for accessing and managing files across multiple devices within a network. This system is built using OpenMediaVault on a repurposed college PC, providing an affordable and efficient way to create a personal cloud.

Objectives

1. Reuse old hardware to build a functional NAS server.
2. Provide centralized storage accessible via LAN and web.
3. Enable secure file sharing and user management.
4. Integrate FTP, SMB, and web access.
5. Learn and implement OpenMediaVault configuration.

Technologies Used

Operating System: Debian/Linux with OpenMediaVault
Software Tools: OpenMediaVault, PuTTY, WinSCP, Web GUI
Network Protocols: FTP, SMB/CIFS, NFS
Hardware: Old PC (with upgraded HDD), LAN Router

Methodology

System Installation

Installed Debian and OpenMediaVault on an old PC and configured it as a NAS server.

Network Configuration

Assigned static IP and configured network access.

User and Folder Setup

Created shared folders and managed user permissions via the OpenMediaVault GUI.

Access Services

Enabled SMB/CIFS for Windows access, FTP for direct file transfer, and web access for management.

Set-up:

1. Prepare the Hardware

- **Old PC**: Ensure you have an old PC or server with a decent amount of RAM and storage. If you need additional storage, consider upgrading the hard drive.
- **LAN Router**: Make sure the router supports wired connections for network access.
- **Cables**: Have network cables (Ethernet) ready for connecting the NAS to your router.

2. Install Debian Linux

- Download the latest Debian Linux ISO.
- Create a bootable USB drive using software like Rufus (Windows) or Etcher (macOS/Linux).
- Boot the old PC from the USB and install Debian on the system, following the on-screen instructions.
- Once installation is complete, configure the PC to boot from the hard drive.

3. Install OpenMediaVault

- After installing Debian, open the terminal and update the system:

  sudo apt update && sudo apt upgrade

- Add the OpenMediaVault repository:

  echo "deb http://packages.openmediavault.org/public usul main" | sudo tee /etc/apt/sources.list.d/openmediavault.list

- Download and install the OpenMediaVault package:

  sudo apt install openmediavault

- After installation, configure OpenMediaVault:

  sudo omv-initsystem

- The system will complete its setup and ask you to reboot.

4. Configure Network Settings

- Assign a **static IP address** to the NAS in your router settings or configure it directly on the system.
- Ensure that the NAS is connected to the network through Ethernet.

5. Access the OpenMediaVault Web Interface

- Open a web browser on any device connected to the same network.
- Type the IP address of the NAS (e.g., http://192.168.x.x).
- Login using the default credentials:
    - Username: admin
    - Password: openmediavault
- Change the password immediately for security purposes.

6. Set Up Storage

- In the OpenMediaVault web interface, navigate to the **Storage** section.
- Add the storage device (e.g., hard drive or SSD).
- Format the disk (if needed) and mount it.
- You can create shared folders on this storage for accessing files.

7. Create Shared Folders

- Go to the **Shared Folders** section in the web interface.
- Create a new shared folder and set the appropriate permissions (read/write access for users).

8. Create Users and Set Permissions

- Navigate to **Access Rights Management** > **User**.
- Create user accounts that will access the NAS.
- Assign each user permissions for specific folders (e.g., read-only or read/write access).

9. Enable Network Services

- Enable the services that allow you to access your NAS over the network:
    - **SMB/CIFS**: For Windows file sharing.

    - **FTP**: For file transfer via FTP client.
    - **NFS**: For Unix-based systems (optional).
- You can enable these services under **Services** in the OpenMediaVault web interface.

10. Configure Backups (Optional)

- Go to the **Backup** section in OpenMediaVault.
- Set up scheduled backups to another drive, network location, or cloud service.

11. Access the NAS

- From Windows, use the **Network** feature or type \\[NAS-IP] in File Explorer to access shared folders.
- For FTP, use an FTP client (e.g., FileZilla) with the NAS IP address and user credentials.
- Access the NAS web interface from any device by typing its IP address in the browser.

12. Configure Remote Access (Optional)

- Set up **VPN** or **Port Forwarding** to access the NAS remotely. This allows you to access files from outside the local network securely.

13. Monitor the NAS

- Use the OpenMediaVault **Dashboard** to monitor the system's health, storage usage, and active services.
- Set up alerts for critical events like disk space running low or service failures.

14. Future Enhancements (Optional)

- Add **RAID** support for data redundancy and fault tolerance.
- Set up **Time Machine** backups for macOS compatibility.
- Implement **cloud syncing** or remote backup solutions.

Features

1. Web-Based Interface for Easy Management
2. Multi-User Access Control

3. Protocol Support: FTP, SMB, NFS
4. Scheduled Backup Support
5. Real-time Monitoring Dashboard
6. Accessible from mobile and desktop devices

Challenges and Solutions

Old Hardware Compatibility: Resolved by testing lightweight OS builds.
Security Concerns: Enforced strong user authentication and firewall rules.
Network Speed: Optimized LAN setup for faster transfer speeds.

References

Use the following YouTube video playlists to create a NAS:

1.https://youtube.com/playlist?list=PLD3A2Yq5sHaH2Z6zGATIDQaY4aiab_dGD&si=Q8LhG5n1UMJH59r5

2.https://youtube.com/playlist?list=PLD3A2Yq5sHaFfSwHyiRhjWWs6xO4jhv0Z&si=ILlW3emyCPcwDaFL

Future Enhancements

1. Add remote access using VPN or port forwarding.
2. Include RAID support for redundancy.
3. Monitor storage health and add alert systems.
4. Setup Time Machine backup for macOS compatibility.

Conclusion

This NAS project successfully turned outdated hardware into a functional, secure, and scalable network storage solution. It serves as a great example of sustainable computing and offers a hands-on understanding of networking and system administration.