

Own Cloud Storage Using Raspberry Pi

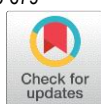
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Abstract: The research proposes a solution to the problem of relying on third-party cloud storage services like Dropbox, Google Drive, and iCloud. The proposed solution involves creating a personal cloud storage using a Raspberry Pi and an external hard drive. This way, the user can have full control over their data and determine the amount of memory they need for storage. One of the main concerns with using third-party cloud storage services is security. By creating a personal cloud storage using Raspberry Pi, the user can ensure that their data is secure and not accessible to other users. Additionally, the user does not have to pay a hefty amount of money to use these services, as they can use their own external hard drive as a cloud storage device. To access the data stored in the external hard drive, the research suggests using ownCloud. This way, the user can access their data from any device with an internet connection, making it easy and convenient to use. Overall, the proposed solution offers a practical and cost-effective alternative to relying on third-party cloud storage services.

Key Word: Cloud storage, Low-cost, Raspberry Pi.

I. INTRODUCTION

Cloud computing is just one of the several networking trends that are shaping the future of technology. These trends will bring about changes in software-based technologies, mobile devices, and skill sets, transforming businesses and suppliers. Cloud storage typically involves storing data on hard drives, which can be more secure than traditional storage methods. What sets cloud storage apart is that instead of storing data directly on a computer or mobile device, it is stored on servers owned by large companies, which are accessible over the internet. Cloud storage technology can be complex, and there are several concepts that are often misunderstood. It is essential to understand the correct concept of storing data in the cloud and how it works. In cloud storage, data is stored on remote servers owned by cloud service providers, such as Amazon Web Services, Google Cloud, or Microsoft Azure. These servers are located in data centers worldwide, and users can access them via the internet. Cloud storage offers several advantages over traditional storage, including flexibility, scalability, cost-effectiveness. Cloud storage is an increasingly popular option for storing data when there is a lack of storage space on a user's device. Cloud Services provide users with the ability to store their data over the internet and access it whenever needed. This eliminates the need for carrying external storage devices and makes it easier for users to manage their data. With the ever-increasing amount of data that people need to store, cloud storage has become an essential part of modern life. It allows users to store their data securely and conveniently, without the need for expensive hardware. Users only need to create an account on a cloud storage service provider and pay a monthly or yearly fee to use the service. One of the significant benefits of cloud storage is its accessibility. Users can access their data using any device with an internet connection. This makes it easier for people to manage their data and work remotely from any location. In conclusion, cloud storage is a useful option for people who have limited storage space on their devices or who want to store their data securely and access it remotely. It is a cost-effective and convenient alternative to carrying external storage devices and has become an essential tool for managing data in the modern age.

II. EXISTING SYSTEM

Cloud storage provides a convenient option to store data over the internet and access it from anywhere, anytime. Popular cloud storage providers include Dropbox, Google Drive, and iCloud. Cloud storage eliminates the need to carry unnecessary storage devices, as users can create an account on one of these services and pay on a monthly or yearly basis to use cloud storage services. As data continues to grow in volume, storing it efficiently has become more critical, given the significant role it plays in critical functions. With cloud storage, users don't need to purchase any storage devices or worry about carrying them around. Instead, cloud service providers offer the storage on their servers the cost of the cloud storage depends on the size and lifetime of the cloud servers, which users can access via any device with internet connectivity.

III. PROPOSED SYSTEM

Third-party cloud services come with privacy concerns, and they typically offer limited storage space while retaining some control over our data. Additionally, these services can be quite expensive. By using a Raspberry Pi, it is possible to turn an external hard drive into our personal cloud storage solution. This allows to determine the amount of storage user need and maintain full control over the data. Own Cloud can be used to access the cloud storage from any device with an internet connection, effectively transforming the external hard drive into a cloud storage device. To create own cloud storage, it will require a Raspberry Pi, an external hard disk drive to use as cloud storage, and a micro SDcard with a minimum capacity of 8GB and a class 10 rating to serve as the Raspberry Pi's ROM. With ownCloud, the user can access our cloud storage, manipulate data, and upload or delete files. While there are several cloud hosting services available, such as Dropbox, Google Drive, and iCloud, creating own cloud storage using a Raspberry Pi and ownCloud provides secure access to the cloud storage drive. First, configure the Raspberry Pi to save data that is stored from ownCloud. To do so, we must install ownCloud on our Raspberry Pi. An external hard drive with a capacity of 500GB to 1TB can be used as a cloud storage solution. To access the cloud storage drive from anywhere in the world, user must have an internet connection.

IV.DESIGN REQUIREMENTS

4.1 Software

Own Cloud is a powerful suite of customer service software that allows users to create and utilize file hosting services. In many ways, it operates in a similar fashion to popular cloud storage solutions like Dropbox. However, the primary difference is that ownCloud's server is free and open-source, allowing users to install and operate it on their own server at no cost. One of the main benefits of using own Cloud is its unparalleled transparency, security, and control. Users have complete control over their data, which is stored on their own server rather than on third-party servers. Additionally, ownCloud can be easily integrated into existing systems, making it a flexible and versatile solution. One of the key advantages of ownCloud is that users can access their company files quickly and easily from anywhere, on any device. This allows for increased safety and productivity, as employees can securely access the information they need from anywhere, at any time. Overall, ownCloud is an excellent choice for businesses and individuals looking for a secure, flexible, and cost-effective file hosting solution.

- a) **Raspbian OS:** Raspbian is an operating system specifically designed for the Raspberry Pi device. It is based on Unix/Linux and comes with a range of programming languages and tools such as Python, Scratch, SonicPi, and Java.
- b) **Linux terminal/Putty:** To configure the OwnCloud server with the Raspberry Pi, users can use the Linux terminal, which is already included in the Raspbian OS. For Windows users, they can use an open source terminal emulator called Putty.
- c) **Constant internet connection:** An internet connection is required to configure and use OwnCloud. The application needs internet connectivity for its proper functioning.
- d) **Application (Owncloud):** OwnCloud is a suite of file hosting services that allows users to store and access their files remotely. It is similar to Dropbox, but the difference is that OwnCloud does not offer data center capacity. It is an open source platform, and users do not have to pay for private servers.

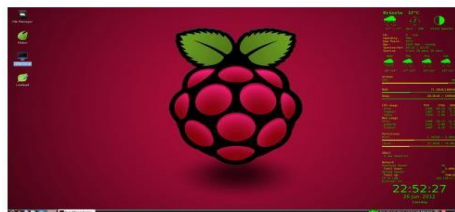


Fig 1: Raspian OS

4.2 Hardware

Computers have become an indispensable tool for communication, entertainment, and access to government services. However, with each new version of Windows or Mac OS, manipulating the code becomes increasingly difficult. Raspberry Pi is a small computer that runs on a power source or battery and uses the ARM-Linux operating system. It is versatile and can be used for various applications such as robotics, thermometers, and MATLAB. Additionally, there are several models with different interfaces to suit different requirements.

To complete the design link and prepare for action, there are several solid components that we need, which are listed below:

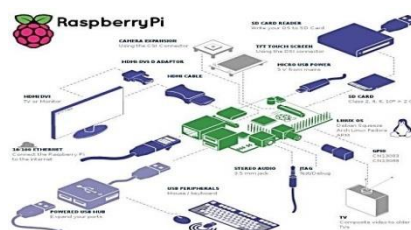


Fig 2: Components of Raspberry Pi

- a) **Raspberry Pi:** The Raspberry Pi is a mini computer used for low computing operations. It has double band LAN, USB ports, and HDMI port, and can also be used as a server.

- b) **Raspberry Pi power supply:** A power supply adapter with appropriate pin type is needed to power up the Raspberry Pi, requiring at least a 5v-10v power supply.
- c) **Micro-SD card 4/8 GB:** A Micro-SD card with a minimum class 10 or U1 rating serves as the Raspberry Pi's ROM, with the entire Raspbian OS installed on it.
- d) **Internet connection (LAN/Wifi):** An internet connection (LAN/Wifi) is essential for setting up and using the device, as all commands and further tasks require an internet connection. A LAN or Wifi is recommended.
- e) **External hard drive:** An external hard drive is necessary to create a centralized cloud storage. The drive must be mounted before use and linked with Owncloud to enable access to the stored files.

V.DESIGN IMPLEMENTATION

Cloud computing has gained immense popularity in recent years, particularly in the fields of research and business. However, security remains a major concern, and there is a need for critical improvements in this area. One of the main advantages of cloud computing is its ability to maintain the confidentiality of user data, ensuring that sensitive information is kept secure. Cloud providers offer a range of storage services and components, including infrastructure and virtualization. Major companies offering cloud services include Amazon, Microsoft, Rackspace, Google, and Salesforce, among others. However, using these services can be costly, and users may not always receive full benefits. To address these issues, we propose building our own cloud server for storing files, images, text, and data, which users can access without paying a fee. This approach allows users to save costs while still taking advantage of cloud computing services.

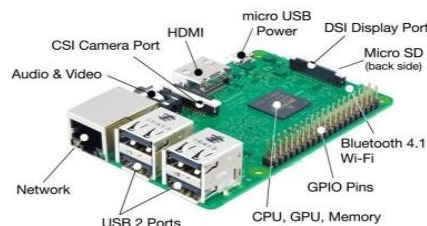


Fig 3: Raspberry Pi

The private cloud offers unique features that are not available with other web services. These features include greater control over server location and enhanced security, as well as the ability to request maximum storage space at a low cost. Administrators can manage user access and allocate storage space based on their needs, and can also add external storage drives when necessary. Synchronization is also a critical feature of cloud computing, enabling users to automatically synchronize data when connected to the internet. Administrators can create groups and share data within the group, with password protection to ensure only authorized users can access the data. These advanced features make private clouds stand out compared to many other freely available cloud server

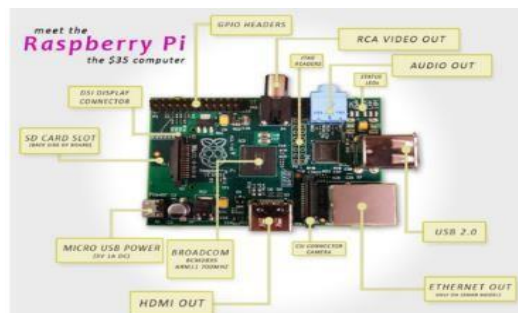


fig 5: Specification of Raspberry

5.1 Cloud Server Implementation

A cloud server is a powerful physical or virtual infrastructure that performs application and information processing and storage. Virtualization software is used to divide a physical server into multiple virtual servers. Cloud storage is a computing model where data is stored on remote servers and managed by a cloud storage service provider, allowing users to customize and share their data over the internet. In the context of a project implemented on a college network, a restricted network with a firewall and blocked ports is utilized. Port forwarding is not feasible for this project, so the Weaved tunnel protocol is used to provide a unique global IP for the device. This allows for the creation of a path or tunnel to the destination server and routing of port 80 requests.

5.2 Raspberry Pi Configuration

The Raspberry Pi can be accessed through a remote control computer on the network via SSH login, and a VNC server is installed to display the GUI-enabled desktop of the Raspberry Pi using the Remote Frame Buffer (RFB) protocol. This provides access to the command line text environment through SSH login using Putty, and once Apache is successfully installed on the Raspberry Pi, the cloud service needs to be installed as well. The Raspberry Pi cloud server is located behind a local ADSL/DSL router which connects it to the internet. To route user requests to access the Pi server, port forwarding needs

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to be set for the Apache server on the specified port number. Alternatively, Weave can be used as a secure substitute for port forwarding. Once the cloud service is set up on the Raspberry Pi, users can log in through the ownCloud portal and store data on the Raspberry Pi from anywhere in the world.

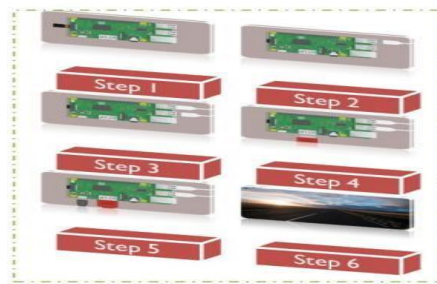


fig 4: Design Configuration

5.3 Raspberry Pi Implementation

The process to set up a Raspberry Pi involves several steps:

1. Download Raspbian: Raspbian can be downloaded from the internet.
2. Unzip the downloaded file: The downloaded Raspbian disk image file needs to be unzipped.
3. Write the Raspbian OS to a microSD card: The microSD card can be connected to the desktop, and Win32 Disk Imager can be used to load the Raspbian OS.
4. Insert the microSD card into the Raspberry Pi: After the installation of Raspbian onto the microSD card, it should be inserted into the Raspberry Pi device. The default username and password are pi and raspberry, respectively.

VI.SETTING UP OWN CLOUD ON RASPBERRY PI

The steps to set up ownCloud on a Raspberry Pi are as follows:

1. Open your browser and enter the IP address of your Raspberry Pi.
2. Ignore the certificate error that may appear and proceed.
3. The initial setup screen of ownCloud should appear without any errors.
4. Enter a desired username and password.
5. Select "storage & database" and enter the external drive path, "/media/ownclouddrive" (if an external drive was set up).
6. Click "finish setup" to complete the process.

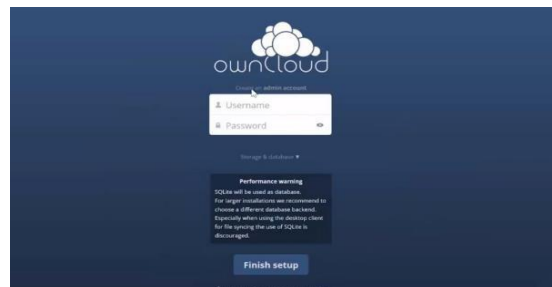


fig 6: Login page of Open Cloud

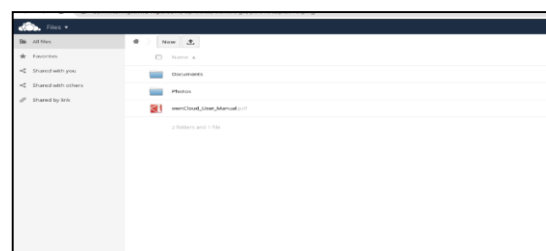


Fig 7: Viewing files in the Cloud

VII.FUTURE WORK

To improve the cloud storage system, it can be made more convenient by allowing remote access to turn it on or off from any location. This can be achieved by creating a mobile app and connecting it to an Arduino board. The Arduino can control a relay that can turn the cloud storage system on or off based on the user's command. By implementing this system, power consumption can be reduced, and security can be increased.

VIII.CONCLUSION

The proposed design provides users with the freedom to use storage space and savings through strong system control. A personal cloud is configured on Raspberry Pi, and similar services are provided to use cloud storage like Dropbox and Google

Drive. This improves the confidentiality and integrity of the data. However, the client's stored data on the server may not be reliably maintained in all time periods. Thus, configuring it on the server console to provide better security and storage seems to be the best choice, even though it may be expensive. The cloud created by us provides a complete idea of the place where we can save our data and offers great data storage safety. The design also aims to provide reliable cloud services for personal use and make them a long-term, cost-effective personal cloud storage product.

References

1. Sharanyaa, S., P. N. Renjith, and K. Ramesh. "An Exploration on Feature Extraction and Classification Techniques for Dysphonic Speech Disorder in Parkinson's Disease." In *Inventive Communication and Computational Technologies*, pp.33-48. Springer, Singapore, 2022.
2. M. Sumithra and Dr. S. Malathi, "3D Denselex NET Model with Back Propagation for Brain Tumor Segmentation", *International Journal Of Curent Research and Review*, Vol. 13, Issue 12, 2021
3. Kamalakannan T and Sharmila K Study on Cloud Storage and its Issues in Material cloud Computing
4. Lakshmi Neelima M and Padma M 2014 A Study on Cloud Storage *International Journal of Computer Science and Mobile computing* 3, pp. 966-71.
5. Cheng Yan 2017 Cloud Storage services *Information Technology*.
6. B. Varghese and R. Buyya, "Next generation cloud computing: New trends and research directions", *Future Generation Computer Systems*, vol. 79, pp. 849-861, 2018.
7. H. Fadhil, "The Perception of Information Security Threats Surrounding the Cloud Computing Environment." *International Journal of Computing and Digital Systems* 7, no. 06 (2018): 375-380
8. Arjun U, Vinay S, "A short review on data security and privacy issues in cloud computing", *Current Trends in Advanced Computing (ICCTAC) IEEE International Conference on*, pp. 1-5, 2016.
9. J. González-Martínez, M. Bote-Lorenzo, E. Gómez-Sánchez and R. Cano-Parra, "Cloud computing and education: A state-of-the-art survey", *Computers & Education*, vol. 80, pp. 132-151, 2015.
10. C. Stergiou, K. Psannis, B. Kim and B. Gupta, "Secure integration of IoT and Cloud Computing", *Future Generation Computer Systems*, vol. 78, pp. 964-975, 2018.
11. IMPLEMENTASI PRIVATE CLOUD STORAGE MENGGUNAKAN RASPBERRY Pi (Ricky Armidha Putra¹), Agung Handayanto²), Setyoningsih Wibowo³)
12. Implementation of Cloud Server for Real-Time Data Storage using Raspberry Pi S. Emima Princy M.Tech, Embedded Systems Karunya University Coimbatore, India emimaprincy@gmail.com Mr. K. Gerard Joe Nigel Asst. Professor, Electronics & Instrumentation Engineering Karunya University Coimbatore, India
13. Sharanyaa, S., S. Lavanya, M. R. Chandhini, R. Bharathi, and K. Madhulekha. "Hybrid Machine Learning Techniques for Heart Disease Prediction." *International Journal of Advanced Engineering Research and Science* 7, no. 3 (2020).
14. W. Hajji and F. Tso, "Understanding the Performance of Low Power Raspberry Pi Cloud for Big Data", *Electronics*, vol.5, no. 4, p. 29, 2016.
15. D. Chou, "Cloud computing: A value creation model", *Computer Standards & Interfaces*, vol. 38, pp. 72-77, 2015.