

Personal Cloud Storage using Raspberry PI

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Abstract: *Developing a Raspberry Pi personal cloud server that can serve as your very own personal cloud storage is the goal of the project "Personal Cloud Using Raspberry Pi." Moving your data to private cloud storage is a preferable solution because privacy protection is a major concern today. The Raspberry Pi 3 model B module that houses the cloud server is configured. The server is linked to the internet by the router. For greater data storage, the server offers an optional USB hard disc. The Raspberry Pi server's wireless network card or adapter is used to link it to Personal Cloud, an open-source cloud computing platform. The Raspberry Pi can be configured remotely from any device, such as a smartphone, using a local tunnel. Numerous services, including SSH, HTTP, and VNC, are configured on and managed by the local tunnel. Access to the Personal Cloud account is restricted to the admin. Through the local tunnel, an administrator can provide users a variety of services. You can store your data for free on our project as needed. With tight system control, this project provides you the freedom to use space efficiently.*

Keywords: Raspberry Pi, Personal Cloud, Cloud Computing, Data Storage

I. INTRODUCTION

Cloud computing is only one of several networking trends in the face of future technology, which will change its technological development today. It will help access mobile devices, new software-based technologies, and change skill sets to change the face of companies and suppliers alike. As a rule, cloud data is stored on hard drives. And yes, it may be safer than traditionally stored data. What makes cloud storage so diverse? To a certain extent from directly stored on your computer (hard drive on your laptop, for example, or the phone), the data to be stored is based on the cloud to another place - servers owned by large companies, usually accessible via the Internet. Cloud data storage technology contains many concepts that are often misunderstood. Today, we will identify the correct concept of storing data on the cloud, and what is the exact one [1] [2].

Basically, cloud storage is an apparent drive in a remote location, which is not attached to a particular computer or physical system. The common way to access this storage is a private application or a web browser. The storage service can provide entry to files and folders, such as sharing a LAN or physically connected device. There are also applications that allow the cloud storage account to access a computer and get entry to it as a drive for local disks. In cloud storage, you can store as much data as you need, as the provider's storage limits are virtually limitless, and most cloud service providers do not care about the space you use [3] [4].

The cloud is a huge storage collection of different amounts of data collected in some servers, which helps the client to connect or access data from the server. As data continues to grow, there is a huge need for a storage server that can retain client paths, profiles, and data such as images, file documents, videos, and so on. Moreover, there is a risk, if our server crashes there may be a loss of someone's personal data or even if the data gets stolen. Sometimes the user is forced to see ads for products and deals on the screen while browsing for applications or third-party sites, and this means that the system somewhere is sharing the user data; which means is not maintained at the level of privacy. Therefore, there is a need for personal storage server maintains privacy and security. Our research uses Raspberry Pi to provide a solution for each of the previous features that lack cloud. First, data will be available to you all the time, such as: Your personal hard disk drive will work as your own cloud server, and secondly, your data will get the most security so you do not get stolen or the server crashes anymore. Our design will also allow you to share your server with others who give them the appropriate documentation [2] [5].

As mentioned here, personal cloud repositories have received a lot of attention from individuals who care about the security and privacy of their data. On the other hand, users are also drawing on the usability, convenience, and cost

advantages of public clouds, through Raspberry Pi to build our own cloud server that can serve as your personal cloud storage. Because protecting your privacy is a big problem right now, moving data to private cloud storage is a better option. The cloud server is configured on Raspberry Pi. The router connects the server to the Internet. The server has an optional USB disk for larger data storage. The wireless / adapter card on the Raspberry Pi server is used to connect the cloud server (open-source cloud platform). Supervisor alone has the right of access to the cloud account. The supervisor can provide a variety of services to users. Our design will provide free data storage according to requirements. It also gives free use of space and savings with strong control of the system [6] [7].

II. LITERATURE SURVEY

1.1 Overview

Cloud computing is not a new technology; it is a new business model that includes a set of technologies such as virtual server simulations that reduce the cost of using IT resources. It benefits from web mechanisms that allow the provision of virtualized technical resources, which expands as a service across a network.

The advantages include the storage cloud and other "immediate payment" cloud services, and the ability to recognize the infinite flexibility, and simplicity of use. When the default storage is available upon request through the network, do not ask the institutions to buy or provide storage capacity before storage. As a result, organizations can provide a large amount of money on storage costs because they do not usually pay only for the storage that you are using [2].

Is the cloud a safe storage option? Cloud security tight, but it is not infallible. Internet criminals can access these files, either by sneaking through passwords or guessing security questions. However, the biggest risk with cloud storage is privacy. Even if data is not stolen or published, it can still be viewed. Legally, governments can request information stored in the cloud, it is up to the cloud service provider to prevent access. It is important to remember that everyone has the basic right to privacy.

In fact, your data is relatively secure in the cloud - potentially safer than your hard drive; in addition, easy access to the files and maintenance. However, cloud services put your data in the hands of other people in the end. If you are not particularly interested in privacy, it is not a big problem [1] [5].

1.2 Advantages and Disadvantages

The cloud computing concept involves the speed in the twenty-first century, which brings a wide range of benefits, the largest of which is the possibility of access to data from anywhere in the world. It does not only lead to increased work efficiency, but also reduces the cost of operations in the long term. The second biggest advantage of cloud storage is the use of remote data backups according to our own convenience, thus reducing the cost of setting disaster recovery units and backup units.

The disadvantages of cloud storage are very few, but the biggest is the increased use of bandwidth to access data that increases the costs of operations slightly. Second, if your Internet connection is not very fast, you may not be able to access the data [8].

1.3 Classifications of Cloud Storage

Cloud storage can be classified into four types as shown in Fig. 1.

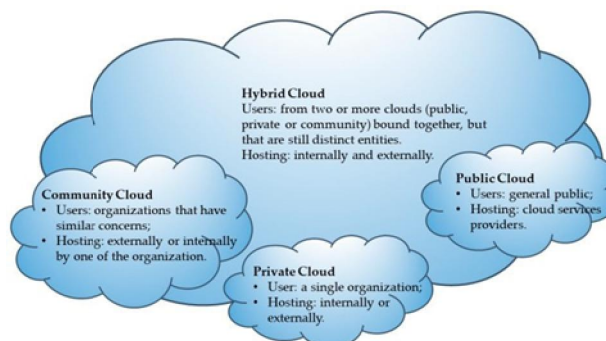


Figure 1. Types of Clouds

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- **Community cloud storage:** Is a cloud service model that provides a cloud computing solution for a limited number of individuals or organizations that are managed, and commonly protected by all participating organizations or a third-party service provider.
- **Publicly cloud storage:** In this type, the user uses a cloud available to everyone, which he has rented or subscribed to for a certain period. Anyone with access to that cloud using the user's credentials can access that data from any part of the world.
- **Privately cloud storage:** The Company that provides cloud storage services sets up the data center in the user's space. The main reason behind the existence of storage space is available on the private cloud is the need to secure a basic system and data access restrictions.
- **Hybrid cloud storage:** In this case, the data is generally available, but some parts of the data are private and therefore limited to some users only. So, this is a run and stop model where it can be converted from generic to private or private to generic at any time according to user convenience [8] [9].

III. PERSONAL CLOUD

Personal cloud provides with many different facilities which other web services fails to provide, like admin knows where is server located, security is in our hands, one can ask for admin the power to control each user, admin the power to control each user, admin can grant or revoke the user, he can allocate the space to a user as per their demands. Own cloud gives you facilities to add external storage drive if your primary drive is about to get full. Personal cloud storage using Raspberry pi services will allow to synchronize local folders with raspberry that act as servers in the cloud. Personal cloud storage offering for free services, synchronizing devices, and sharing content. Personal cloud storage also can be referring the way to access software and storing data in the cloud representation of the internet. It is also an excellent way to make sure all your files are accessible at anywhere you go.

Raspberry pi is also best alternative to make personal cloud storage because it confirms about the security.

IV. RASPBERRY PI

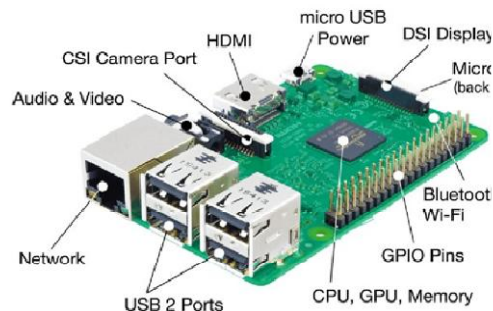
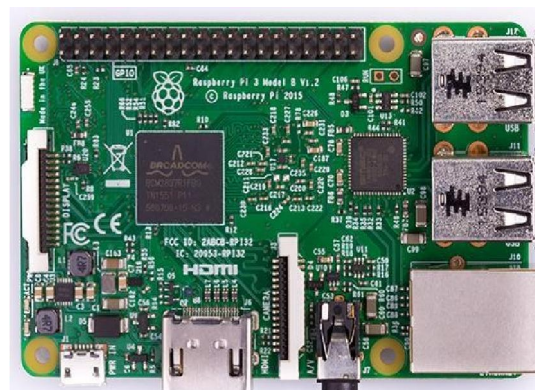


Figure 2. Raspberry Pi 3 module B

As mentioned before, we need a server to set up the Inbuilt features like Bluetooth, Wi-Fi, expandable memory, an HDMI port, a USB port, and other features make the Raspberry platform operate like a standalone computer. By putting external storage on it, the Raspberry Pi is set up as a server.

V. REQUIREMENT ANALYSIS

5.1 Software

Personal cloud is a set of customer service software to create and use file hosting services. Personal cloud is functionally very similar to commonly used Dropbox fairly, with the primary functional difference is that the server of the free and open-source Personal cloud, thus allowing anyone to install and run without charge in your server. Personal cloud offers unsurpassed transparency, security and control and can be flexibly integrated into the existing environment. At the same time, users can access company files quickly and easily from anywhere and from any device. This increases both safety and productivity.

5.2 Hardware

Computers are now essential tools for communication, entertainment, and access to all kinds of government business and services. But at a time when computers have become so critical, computers have become increasingly closed. It is not impossible to manipulate the courage of a computer running Windows or Mac OS, but it is difficult and more complex with each new version. A few children have the courage to seriously mess with a dad computer. But parents usually condone this behaviour. Raspberry Pi is a small, card-sized computer that can operate on a power source or battery power, see Fig. 2. Raspbian is an operating system (OS), but there are many other variables for the ARM-Linux operating system. This miniature device can be used for robots, hallway machines and thermometers. It can also be used for MATLAB applications, among other applications, and comes in a variety of models with different interfaces for different requirements [11] [12].

There are also several solid components that we need to complete the design link to be ready for action, which are listed below:

- HDMI
- Power Supply
- Keyboard and Mouse
- RAM
- Monitor

VI. ARCHITECTURE

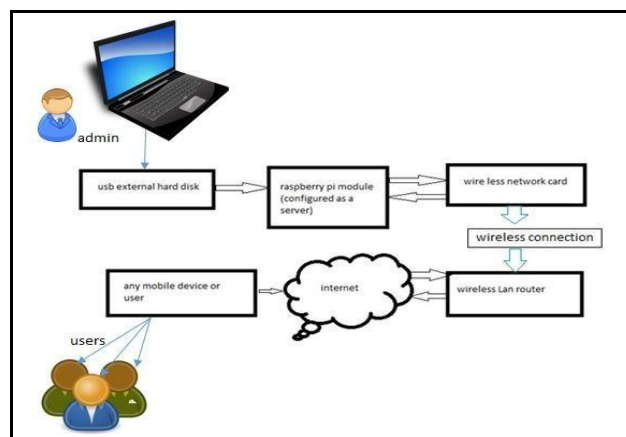


Figure 3. Architecture

The flow of the project is as follows:

1. We access the shell of raspberry Pi through a remote computer connected to raspberry Pi on a network through SSH login.
2. We also install VNC server on Raspberry Pi which uses remote frame buffer (RFB) protocol to show the GUI enabled desktop of Raspberry Pi. This gives us more ease of access than the command line text environment through SSH login using PuTTY.
3. After we have successfully accessed the Pi we setup an Apache sever on Raspberry Pi.
4. Now we install cloud service on Raspberry Pi.
5. The Raspberry Pi cloud server is now behind the domestic ADSL/DSL router. The router connects the Pi server to internet.
6. Request from users for server access is forwarded to Pi by the router only when we set up port forwarding for the Apache server on port nos. 80 and 443(http and https port numbers).
7. Local tunnel is a secure alternative to port-forwarding.
8. After the cloud service is setup on Raspberry Pi users can login through the Personal Cloud portal and store their data on Raspberry Pi from any corner of the world.

VII. IMPLEMENTATION

Cloud computing has become more and more popular and powerful in gaining everyone's attention in the field of research and business as well. Additional security is a major issue and needs critical improvement in cloud computing. The information of users is kept secret which protects the confidentiality of users and their data over the cloud. The cloud maintenance perspective is the major advantage in cloud environment by the cloud providers. The cloud provides lots of storage services and major components which includes infrastructure, virtualization. Top companies giving cloud services include Amazon, Microsoft, Rackspace, Google, Sales force and so on. However, using these types of cloud services does not come in handy. Users must pay a certain amount to use their services and neither gets the full advantage of using it. So, in our proposed system we can build our own cloud server for storing files, images, text, data etc. The user can use without paying the fee for obtaining services and hence save the cost of using large cloud service [13].

The private cloud provides many different facilities that are not provided by other web services, such as the supervisor knows where the server is located, and security in our hands, one can request maximum storage space at the lowest cost. The private cloud gives the administrator the ability to control each user, the administrator can grant or revoke the user, can allocate the space to the user according to their demands. The private cloud gives facilities to add an external storage drive if the primary drive is about to be full [6] [10].

7.1 Implementation of the cloud server by Raspberry

A cloud server is powerful physical or virtual infrastructure that performs application and information processing storage. Cloud servers are created using virtualization software to divide a physical (bare metal) server into multiple virtual servers. Cloud storage is a cloud computing model in which the data is stored on remote servers and maintained by a cloud storage service provider. This allows users to customize their data and share it with friends and business partners over the Internet. Including that we have implemented our project in the college network, we use mainly restricted network with firewall and blocked ports. Thus, port forwarding is not a possible option for the scope of our project. Local tunnel uses a tunnel protocol to resolve this problem. It provides a unique global IP for the device that is Function of their actual address. Thus, we can say that it makes a path or tunnel to the destination server and server Route 80 port requests on it.

7.2 Raspberry Pi Configuration

Raspberry Pi shell could be accessing the through the remote-control computer connected to Raspberry Pi on the network through SSH login. Also, the VNC server is installed on Raspberry Pi which uses the Remote Frame Buffer (RFB) protocol to show the GUI-enabled desktop of Raspberry Pi. This provides us cool access to the command line text environment through SSH login using PuTTY. Subsequently successful access to PI promise to cut Apache on the

Raspberry Pi. Now the cloud service needs to be installed on Raspberry Pi. Raspberry Pi cloud server is now behind the local ADSL / DSL router. The router connects the server to the Internet. The request from users to access the Pi server is routed by the router only when setting port forwarding for the Apache server on the port number. Weave is a safe alternate to port forwarding. After setting up the cloud service on Raspberry Pi users can log in through the personal cloud portal and store data on Raspberry Pi from any corner of the world.

7.3 Local Tunnel

Since we have performed our project on the college network, we are basically using a restricted network with firewalls and blocked ports. Hence, port forwarding is not a feasible option for the scope of our project.

Local tunnel makes use of tunnelling protocol to solve this problem. It provides a unique public IP to the device which is a function of its physical address. Hence, we can say that it makes a path or a tunnel to the destination server device and forwards requests of port 80 on it.

VIII. APPLICATIONS

- Lab Environment
- Small scale companies
- Personal Cloud Storage

VIII. CONCLUSION

With powerful system control, this project provides you the ability to use storage space and make savings. We set up a personal cloud on a raspberry pi, after which we offer services for using one's own storage in a manner akin to Dropbox and Google Drive. Consequently, the information's or data's integrity or secrecy. The client or user's data that is stored on the server is not consistently kept up to date. The first approach appears to be costly, therefore setting up a server on our own Raspberry Pi module looks like a better choice for our own personal storage. Since it is a cloud that we have constructed, we know exactly where our data will be saved, ensuring the highest level of data protection. In the long run, we want to make personal cloud storage a viable product by offering dependable cloud services for that purpose.

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