



Private Cloud using Raspberry Pi

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Abstract - A trend towards cloud computing has been going on for several years now. Along with this trend, several issues and concerns regarding privacy and security emerged, which are the challenges of traditional computing. Mainly, the practice of cloud computing is clearly defined and dissected by NIST as different services. One particular service, data storage, is analyzed and compared to the "private cloud using raspberry pi" solution.

Key words : Raspberry pi, Cloud computing

I. Literature Survey

Energy-Efficient Computing: A Comparison of Raspberry PI with Modern Devices by Waqas Anwaar*, Munam Ali Shah Department of Computer Science COMSATS Institute of Information technology Islamabad, Pakistan.

This paper analyzed the power, energy consumption, and cost-effectiveness of the raspberry pi with other devices. It concluded that the raspberry pi is better than most devices in those factors especially useful when it comes to using it for fundamental hardware-software solutions.

Implementation of Cloud Server for

Real-Time Data Storage using Raspberry Pi by S. Emima Princy, Mr. K. Gerard Joe Nigel Electronics & Instrumentation Engineering Karunya University Coimbatore, India. This paper discusses the real-time projection of an ECG type signal from an Arduino UNO connected to the raspberry pi to a cloud storage setup.

WSN for Traffic Monitoring using Raspberry Pi Board Michal Kochlán, Michal Hodon, Lukáš Čechovič, Ján Kapitulík, Matúš Jurečka Science and Informatics Univerzita 8215/1, 010 26 Žilina, Slovakia

This project discusses the usage of the raspberry pi for a cost-effective, non-intrusive traffic data collection system using a camera module and processing the data using machine learning before sending it to a cloud server node via RF transmission.

II. Introduction

Information technology has metamorphosed into an important base where the substantial matters of private users are documented and stored in a data repository. When it comes to data storage many use media physical storage such as flash drives and hard disks so that all data can be stored neatly and centrally in one storage media. Cloud storage is one of the cloud computing models that store data on the Internet. Cloud storage is one solution to overcome the management of files or data so that centralized and easy access to the data can be enabled for system users entitled to access. In addition to security, data availability, and convenience more network infrastructure maintenance is guaranteed.

Setting up your own cloud can therefore be certifiably advantageous for a handful of factors.

Large companies possess the authority to secure numerous possible risks of cloud computing through specific contracts arranged with cloud providers. This involves proprietorship of data, IP protection, and law enforcement in case of security violations and a lot of further risks.

In contrast, many individual consumers do not possess this authority and are abandoned with numerous problems. These entail

the trustability of the service, data security, privacy, increased reliance upon a third party, fairness, clarity of the unnegotiable terms and conditions, and so on.

Three main service platforms iCloud, Google Drive, and Dropbox all address comparable pricing schemes that contain free basic memory and yearly charges for extended memory. Google Drive takes the lead currently with 15 GB of free memory, which is 3 times over iCloud's basic memory and nearly 8 times over what Dropbox offers for free, 2 GB. For 1 TB of memory, you'll spend about 900 per month on all of these platforms. Given that subscribing to the 1 TB scheme for 1 year would cost you further than buying a 1 TB hard drive, for numerous people, the choice is snappily made.

The purpose of this research is the implementing Owncloud as a private cloud storage interface using a Raspberry Pi so that the data can be stored neatly and easily managed, and can be accessed via the internet as a solution to the above-discussed concerns.

I. Design

A) Hardware

Raspberry Pi is a powerful small computer designed on an ARM-based microcontroller. It works on Linux OSes like Raspbian, Debian operating systems. A Raspberry Pi with a set operating system SD card, USB, keyboard, mouse, HDMI display, energy source, and wires it is viable to fabricate the Raspberry Pi to function as a common general-purpose computer.

A. OS Installation

Raspberry Pi doesn't possess internal storage or built-in operating OS and it requires an SD-boot card that's set up to start the Pi. An SD-card has to be connected to the normal windows machine using a card reader. From the Raspberry Pi's website NOOBS has to be downloaded and decompressed the same in the SD-card after which the SD-card serves as the internal storage for the Raspberry Pi and using the NOOBS main menu Raspbian OS can be installed in it. As soon as the SD card is fitted in the Raspberry Pi, the device boots up.

B. Internet Settings

The fastest way to get the Raspberry Pi connected to the internet is to connect an Ethernet cable and to just plug it into the network router. For this to work, the router should be configured for DHCP (Dynamic Host Configuration Protocol). Wired network configuration can be done by making changes in the configuration train in the path

/etc/network/interfaces.

Wireless network configuration can be done using USB Wi-Fi adapters, which are compatible with the Raspberry Pi. There's a list of USB Wi-Fi adapters supported by default by the Raspberry Pi.

Hardware Specs: Raspberry Pi 4 Computer Model B 4GB LPDDR4-3200 SDRAM, Broadcom BCM2711, Quad-core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz, 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, BLE Gigabit Ethernet, 2 × micro-HDMI ports (up to 4Kp60 supported) and Micro-SD card slot for loading operating system and data storage.

B) Software

Install OwnCloud on the Raspberry

now Owncloud Software has to be set up along with the database on raspberry pi. On older versions of Raspbian, it was necessary to manually install OwnCloud and all its dependencies. Fortunately, the new version sees the addition of OwnCloud to the official Raspbian repositories, greatly simplifying its installation, the advantage of this being the fact that the owncloud dependencies are installed automatically and the repository being updated. To install OwnCloud, the following command has to be run:

```
sudo apt-get install owncloud
```

OwnCloud can be installed with the MySQL database as it has the advantage of being used by many projects, avoiding having to manage several database systems on adding other software to your Raspberry Pi. the following command is used to install the maria db server:

```
sudo apt-get install MariaDB-server
```

the maximum weight authorized by Apache when uploading files has to be increased to make it more practical to send files via the OwnCloud interface for which in the “/etc/php5/apache2/php.ini” file:

```
sudo nano /etc/php5/apache2/php.ini
```

the “post_max_size” line and the “upload_max_filesize” line are edited to a higher value and restarted to apply the value changes. it is also necessary to ensure that the

.htaccess files are taken into account by the server, for this, the configuration file “/etc/apache2/apache2.conf”.

```
sudo nano /etc/apache2/apache2.conf
```

is edited such that all lines containing "AllowOverride None" is changed to "AllowOverride All" and restarted

A. Configure MySQL for OwnCloud

First, we connect to MySQL with the following command:

```
MySQL -u root -p <your_password>
```

The password to use is that of the "root" user of MySQL. You must not put a space between the "-p" argument and the password. Now that we are connected to MySQL, the “owncloud” database can be created with the command below:

```
create database owncloud;
```

B. User creation

Users can be added and given certain data access privileges. To give a user full rights to the OwnCloud table the following command is run:

```
GRANT ALL PRIVILEGES ON owncloud.* TO <user_name>@localhost IDENTIFIED BY '<user_password>';
```

C. First connection to OwnCloud on the Raspberry Pi

Now to finalize the installation the URL of your Raspberry Pi in the owncloud folder has to be opened on a browser. the address of your Raspberry Pi on your internal network has to be used. a configuration page would open. The first two fields are to create the administrator account. A field intended to fill in the absolute path of the "Data" folder is pre-filled, this is the folder where the files will be stored. By default OwnCloud uses MySQLite, but we can also change it by clicking on "storage and database". To use MySQL instead, MySQL/MariaDB has to be selected, a form appears where the enter the name of the MySQL account, the password of the latter,

the name of the database, and finally the address of the database has to be entered. With the software, the installation would be complete

II. Implementation

The Raspberry Pi's low energy consumption makes it much suited to the function of an always-on server. With Owncloud, the proprietorship is reserved and since it's set up on a Linux OS complete authorization for access is allocated exclusively to the root user. Security and control of the shared data are also assured.

Using Owncloud, data can be shared between devices. data can be uploaded onto the server and can be reacquired from it. Owncloud can also be employed to share data across the Internet which is one of its salient features.

Sharing the data across the Internet that is, accessing Owncloud on the Pi from a remote position requires that the Pi should be configured with the internet settings.

III. Conclusion

Based on research from private Cloud Storage Implementation using a Raspberry Pi that has been executed, we conclude that:

1. To design a Cloud network Storage using Raspberry Pi Requires a web server, PHP, MySQL as database, and application Nextcloud as an interface. This system can be accessed via PC/Laptop or smartphone which has a web browser like Chrome, Mozilla Firefox, Internet Explorer, Opera Mini, and other web browsers.

2. The interface system used i.e. Owncloud using Raspberry Pi device that uses a little power so that can be turned on with

using a portable power supply.

3. Private Cloud Implementation Storage on Raspberry Pi running like a function expected on cloud storage generally, that is the feature for download files, upload files, and share files.
4. Utilization of the Owncloud application can still be explored, the wrong one of which is being able to do data synchronization automatically from the device users into the system.
5. The system can be added with a hard disk as needed in the future if the micro SD used to install Nextcloud has reached its limit maximum.
6. Because this system is designed to be accessible via an internet network, security on the system must be upgraded in the future.
7. Because the Raspberry Pi uses a micro SD as a where to install the operating system can use a micro SD better and access speed fast read/write data.

IV. References

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