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RASBI CLOUD: RASPBERRY PI

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Abstract: - Cloud computing is a current buzzword in the market.Cloud computing is the computing technology which provides resources like software and hardware services over the internet**.** Cloud computing promises to cut operational and capital costs. Cloud computing provides numerous services, in terms of (IaaS) the protection of data privacy becomes doubtful on moving files to a private cloud storage. It is important to remember that since the data will be stored on a third-party device while getting storage space from a third-party cloud service provider, to overcome the drawback the proposed system provide a highly-secured cloud storage server. The cloud computing is a very good technology, on the other hand raspberry Pi is a marvellous innovation. The combination of good technology and the marvellous innovation to provide a prone free secured data storage is the aim of proposed system. The system illustrates a design of Raspberry Pi Own cloud server this can act as your very own personal cloud storage.

Keywords – Raspberry Pi, Infrastructure as Service, Own Cloud Server.

1. Introduction

There is various kind of computing in which the term cloud computing plays a vital role. Cloud computing technology has been identified in a McKinsey Global Institute study in May 2013 as one of the twelve economically disruptive technologies of the early 21st century. In developing countries like India, many of these technologies have significant potential and promise. In particular, cloud computing has been identified as an immediate impact technology. A cloud service is any service made available to users on demand via the Internet from a cloud computing provider's servers as opposed to being provided from a company's own on-premises servers. Cloud storage is a cloud computing model in which data is stored on remote servers accessed from the Internet, or "cloud." It is maintained, operated and managed by a cloud storage service provider on a storage servers that are built on virtualization techniques. A cloud server is a logical server that is built, hosted and delivered through a cloud computing platform over the Internet. Cloud servers possess and exhibit similar capabilities and functionality to a typical server but are accessed remotely from a cloud service provider. The biggest concern about cloud computing is privacy & security. Since data management and infrastructure management in cloud is provided by third-party, it is always a risk to handover the sensitive information to such providers. Although the cloud computing vendors ensure more secure password protected accounts, any sign of security breach would result in loss of clients and businesses, this can be a drawback towards the existing technology.

The proposed work aims at providing solution to above mentioned issue by providing a solution using Raspberry Pi Computer in the most cost effective way. Here the approach used is very simple and can be adapted by little modifications. The proposed technology is designing a cloud server into our own server.

Raspberry Pi computer can be connected to internet using either Ethernet based connection using RJ45 cable connected to local Ethernet switch or it can be connected to internet using USB Wi-Fi dongle if WIFI internet connection is available. The board runs on Linux operating system which can support many programming languages like C, C++, Python, Java etc.… for our job, we've selected to use php for scripting and the raspberry pi can be remotely connected by using a software called putty via SSH operation.

2. What is Cloud Computing

The term Cloud refers to a Network or Internet. In other words, we can say that Cloud is something, which is present at remote location. Cloud can provide services over network, i.e., on public networks or on private networks, i.e., WAN, LAN or VPN. Applications such as e-mail, web conferencing, customer relationship management (CRM), all run in cloud. Cloud Computing refers to manipulating, configuring, and accessing the applications online. It offers online data storage, infrastructure and application. We need not to install a piece of software on our local PC and this is how the cloud computing overcomes platform dependency issues. Hence, the Cloud Computing is making our business application mobile and collaborative Deployment models define the type of access to the cloud, i.e., how the cloud is located? Cloud can have any of the four types of access: Public, Private, Hybrid and Community. Service Models are the reference models on which the Cloud Computing is based. These can be categorized into three basic service models as listed below: 1. Infrastructure as a Service (IaaS) 2. Platform as a Service (PaaS) 3. Software as a Service (SaaS). IaaS provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc.

3. Raspberry PI

Raspberry pi B is a portable, powerful and minicomputer. The board length is only 85mm and width is only 56mm.Its size only as big as a credit card but it is a capable little PC. It can be used for many of the things that your desktop PC does, like high-definition video, spread sheets, word-processing, games and more. Raspberry Pi also has more wide application range, such as music machines, parent detectors to weather stations, tweeting birdhouses with infra-red cameras, lightweight web server, home automation server, etc. It enables people of all ages to explore computing, learn to program and understand how computers work.

The Raspberry Pi Model B provides more GPIO, more USB than Model B. It also improves power consumption, audio circuit and SD card.

It is more useful for embedded projects. The Model B is the higher-spec variant of the Raspberry Pi. Compared to the Model B it has More GPIO. The GPIO header has grown to 40 pins, while retaining the same pinout for the first 26 pins as the Model B. We have 4 USB 2.0 ports, compared to 2 on the Model B, and better hot plug and over current behaviour. The old friction-fit SD card socket has been replaced with a much nicer push-push micro SD version. By replacing linear regulators with switching ones we've reduced power consumption by between 0.5W and 1W. The audio circuit incorporates a dedicated low-noise power supply. We have aligned the USB connectors with the board edge, moved composite video onto the 3.5mm jack, and added four squarely-placed mounting holes.

The sound output from the original model B is generally considered something of a joke. If you need reasonable quality audio, you have to use an external sound card. The Raspberry Pi (like almost all computers) is digital. It processes information in 1s and 0s, or high and low voltages. However, sound waves are analogue. That means that they vary across a whole spectrum rather than just flipping between two states. The model B had no problem processing the digital sound, however the digital-to-analogue converter (DAC) was prone to adding noise into the output that wasn't supposed to be there. The reason for this is that on the model B, there was a 3.3-volt supply that powered several components on the board, one of which was the DAC. If one of the other components drew current from the 3.3-volt line while sound was playing, it could cause the power supply to fluctuate slightly, and this fluctuation caused distortion to the analogue output. On the B+, the DAC has its own power supply from the new regulator, which means there's nothing else to make the current fluctuate and therefore the sound output is much better. There are also some other minor changes to the audio processing to make it perform better. Serious audiophiles may still want additional audio hardware, but the Pi's sound output should now be good enough for most people.

4. Software Requirement

The raspberry pi's raspbian operating system is preloaded with the GCC compiler suite. This GCC compiler is not needed to be installed separately and hence raspberry pi directly run C programs without installing anything extra. But the embedded coding requires access to the Raspberry Pi GPIO's and for that sake; it's a must to install additional libraries. In the short time that the Raspberry Pi has been around, a considerable number of programming languages have been adapted for the Raspberry Pi, either by the creator of the language, who wanted to support the Pi by porting their creation or by enthusiastic users who wanted to see their language of choice available on their platform of choice. The Raspberry Pi Foundation recommends Python as a language

for learners. Any language which will compile for ARMv6 can be used with the Raspberry Pi, though; so, you are not limited to using Python. C, C++, Java, Scratch, and Ruby all come installed by default on the Raspberry Pi. To access the raspberry pi remotely via,
SSH we need to have a putty software to be installed in the remote system. Then we need to install NGINX server.

5. Hardware Requirements

The proposed system requirements depend upon the software at most but also, we need some hardware equipment that can be listed below.

i. Raspberry PI.
ii. 8GB SD card.
iii.Wi-fi dongle.
iv.External Hard disk.

6. System Development

System consist of raspberry pi model B+ with an 8GB SD Card. Below is the system block diagram

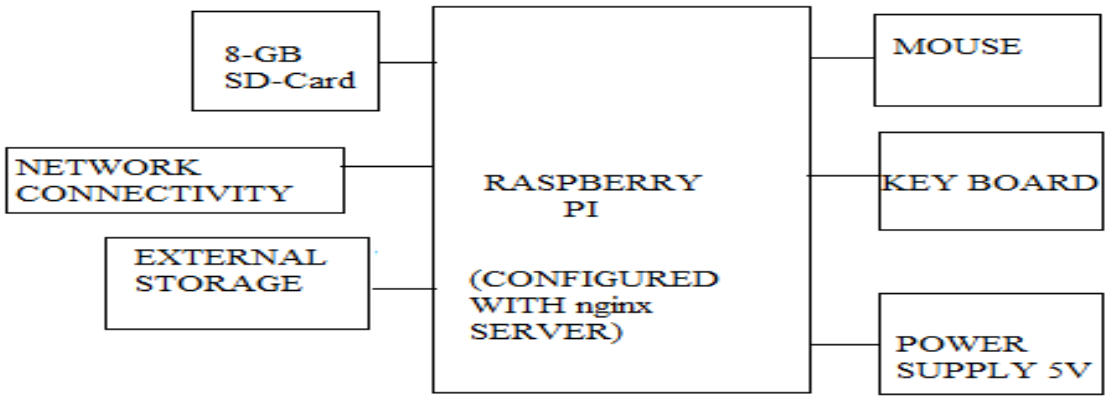

Figure 1.Block Diagram

Above figure shows block diagram of the system. The raspberry pi is having 8 GB SD card with Raspbian Operating system installed. The system should be enabled (SSH) to connect the system remotely by using a software called putty. Then install all the packages required for the raspberry pi, download nignix server configuration and then edit the respective IP address to connect the server. The UI/UX can be created by your own by using web creation languages like HTML, HTML 5, etc. or it can be hosted through some private own cloud providers like Drop box, Own cloud etc. while providing web based UI/UX or getting hosted from providers we have to more conscious about security. Then to connect the server from an external network port forwarding should be performed. Finally, the storage server can be connected from anywhere around the globe.

7. NGNIX Server

NGNIX is a web server with a strong focus on high concurrency, performance and low memory usage. It can also act as a reverse proxy server for HTTP, HTTPS, SMTP, POP3, and IMAP protocols, as well as a load balancer and an HTTP cache. NGINX is a free, open-source, high-performance server. NGINX is also known for its stability, rich feature set, simple configuration, and low resource consumption.

8. SSH

Secure Shell (SSH) provides an open protocol for securing network communications that is less complex and expensive than hardware-based VPN solutions. Secure Shell client/server solutions provide command shell, file transfer, and data tunnelling services for TCP/IP applications. SSH connections provide highly secure authentication, encryption, and data integrity to combat password theft and other security threats. Clients and servers are mature native Windows implementations that offer a range of SSH capabilities and are interoperable with SSH software on other platforms. Secure Shell is a protocol that provides authentication, encryption and data integrity to secure network communications. Implementations of Secure Shell offer the following capabilities: a secure command-shell, secure file transfer, and remote access to a variety of TCP/IP applications

via a secure tunnel. Secure Shell client and server applications are widely available for most popular operating systems. Command shells such as those available in Linux, Unix, Windows, or the familiar DOS prompt provide the ability to execute programs and other commands, usually with character output. A secure command-shell or remote logon allows you to edit files, view the contents of directories and access custom database applications. Systems and network administrators can remotely start batch jobs, start, view or stop services and processes, create user accounts, change permissions to files and directories and more. Anything that can be accomplished at a machine's command prompt can now be done securely from the road or home.

9. Port Forwarding

Port forwarding is a powerful tool that can provide security to TCP/IP applications including e-mail, sales and customer contact databases, and in-house applications. Port forwarding, sometimes referred to as tunnelling, allows data from normally unsecured TCP/IP applications to be secured. After port forwarding, has been set up, Secure Shell reroutes traffic from a program (usually a client) and sends it across the encrypted tunnel, then delivers it to a program on the other side (usually a server). Multiple applications can transmit data over a single multiplexed channel, eliminating the need to open additional vulnerable ports on a firewall or router

10. Conclusion

As illustrated in this project, the practical application has been created. The cloud server has been tested by using both own UI/UX web page and web host providers page. The cloud server has been pinged from various locations. The external hard drive has been designed by using NTFS technology. The files have been stored and retrieved from various kind of platforms and systems. Due to the continuous working of the server the raspberry Pi kit is provided with an external fan to avoid evolving heat. The proposed system with the providence of highly-secured data storage cloud server can be deployed in Industries with high conscious of data security.

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