

IMPLEMENTING LOCAL OPEN-SOURCE NETWORK ATTACHED STORAGE FOR HIGHER EDUCATION

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Abstract. Nowadays organizations, institutions, etc. are storing their data, record and other significant file locally or cloud. Storage is very important for educational institutions and other businesses to store and protect all data such as employee's personal information, assessment records of the students, school maintenance budget plans, payrolls of employee and accounts of students, etc. It is important that all of those data are secured and stored properly because some of this data are stating money and other private information needs to be secure and safeguard. The proposed project is an appropriate solution in the current storage problems in the basic education department. The local open-source network attached storage resolves the issues of the storage in San Carlos College basic education department. The principal/administrator, coordinators and users can manage their files in their assigned folders and also, they are contented that the files that they stored is secured since files and folders of admin and coordinators cannot be accessed by others.

Keywords. Local Open-Source Network-Attached Storage, FreeNAS, Snapshots, ZFS, Network Attached-Storage Data Protection

1 Introduction

Nowadays organizations, institutions, etc. are storing their data, record and other significant file locally or cloud. Storage is very important for educational institutions and other businesses to store and protect all data such as employee's personal information, assessment records of the students, school maintenance budget plans, payrolls of employee and accounts of students, etc. It is important that all of those data are secured and stored properly because some of this data are stating money and other private information that needs to be secured and safeguarded. Increasing size of data, security, accessibility, file sharing etc. depends on how fast the internet connection. Storing files to the cloud storage rally depends on how fast the internet connection and it could result to the slow performance of the computer. Based on the stated grounds, the proponents believe that it is very timely to implement a local open-source network attached storage for educational institution

To make the proposed project feasible, the study followed a framework that serve as the pattern of operations. Figure 1 is the framework of the proposed local open-source network attached storage and how it is working. Based on user requirements, system requirements determined such as the storage capacity, the needed memory, and machine's specification. Knowing the hardware requirements, configuration of the local open-source network attached storage will done. Features such as file sharing, web interface, data protection, snapshots, replication and encryption are set. These features are set up according to the user's requirements. The proposed project can be accessed through the use of browser, client's computer of different platform can access and manage it. Operating systems such as Windows, Android, iOS, Linux and BSD can be used as long as it is installed with an internet browser capable of accessing the proposed storage facility.

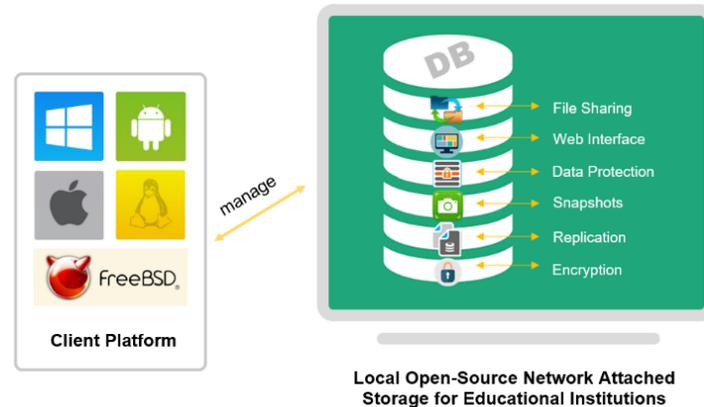


Figure. 1. Operational Framework

2 Review of Related Literature

IT pros said they were concerned with a variety of issues that caused data loss in the business. 31% of them said that hardware or system caused the failure, and 29% is lost data due to human error, and 29% mentioned that viruses, malware or ransomware led to data loss. With what devices were most of failure cause of data loss, IT professionals said that the laptops are mostly to blame by 39%. 26% said they are worried about servers, and another 26% about desktops. Only 4% were concerned about tablets and mobile devices failing and causing data loss (Antwi-Agyie et.al., 2017). Usability testing end up to be incredibly valuable in user interface design. Watching users interact with the software taught the proponents some of the pitfalls in software's initial design (StorageCraft, n.d.).

FreeNAS is compatible with all support of FreeBSD and it supported an array chipset and network controllers (Colleen Knuff, n.d.). FreeBSD or BSD "Berkeley Software Distribution" and base on Greg Lehey BSD kernel can handle scheduling, memory management, symmetric multi-processing device drivers that we have BSD in our NAS to support the other files and to manage the memory (Marco Chiappetta, 2014). These ensures that FreeNAS can connect different operating system's file sharing regardless of the platform they are using. iXsystem that if fast performance is to be desired, it will need a 64-bit machine. 64-bit is the recommended to use in NAS (Greg Lehey, n.d.). With the use of open-source network attached storage, institution can assure that those files is well protected. Most of computer nowadays are in 64-bit and there is no problem in finding one. Ritika Tiwara says that the cloud is important to all individuals in order for them to secure cloud their data by backing it up (iXsystem, 2014). A backup should include saving duplicate data. Having duplicate copies of your most important data is really important for unforeseen circumstances such as crashing of compilers, virus infection and others.

3 Research Methodology

3.1 Population and Locale

Stakeholders involved in this project includes principal, teachers, and the IT personnel in the basic education department. The proposed program is tested by the teachers and evaluated the features intended are properly setup or configured. Teachers and the IT personnel attest the local open-source network attached storage if the desired functionality of the project has been appropriately working. Not all employees are asked to test but a sample population are not enough to evaluate the feasibility and acceptability of the proposed project.

The proposed study is conducted in San Carlos College located at Mabini St., San Carlos City, Pangasinan. San Carlos College, formerly PIEAS. Collaboration between the basic education department is done for the testing and implementation of the proposed project.

3.2 Data Analysis

The proponents choose network development life cycle as the methodology that will be used for the proposed study. Figure 2 shows the network development life cycle and its phases.

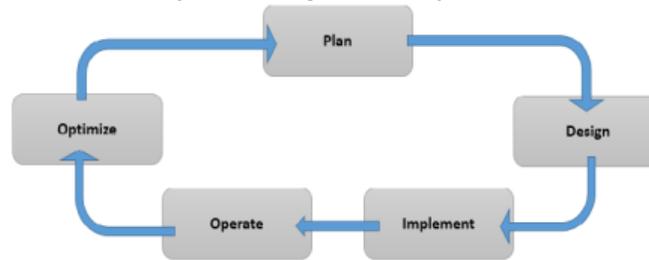


Figure. 2. Network Development Life Cycle

The network development life cycle model comprises of five expressive phases as described in figure 2 these are plan, design, implement, operate and optimize. The plan phase is the first step wherein it involves the planning and gathering of relevant information for the proposed project. The design phase usually represented as network diagram that serves as the blueprint for of implementing the project physically. In design phase, the finished design was implemented. Operate phase is where the process of actually using the proposed project. The project is operated in order to test its effectiveness. This phase covers all day to day operation and maintenance of the local open-source network attached storage. In the optimize phase, the feedbacks coming from the stakeholders are considered.

4 Presentation, Analysis and Interpretation of Data

Upon the evaluation using the questionnaire (Table 1), 20 evaluators agreed that the network attached storage is a server that can solve the issues that they encountered before. 20 respondents said that they can easily access the storage. But eight (8) only got an average score of 93% because one (1) respondent didn't understand the process of managing files despite the proponent's discussion on the latter. Some files according to the evaluators are not accessible because the proponents created an account in every dataset in the system without a permission to the owner the user cannot access all the files in the folder that was given to others. 93% respondents said that they cannot access the storage through mobile device because they did not try to access the storage through mobile except their IT personnel, only the IT personnel tried to access the storage through mobile device having an average result of 7%. The proponents gathered 100% results for other (15) questions because they did not encounter some errors in the system, they can access the system over the network and they are agreed also that there's is an authentication procedure before they can login and they can access files over the network.

After accessing the files, they can create a file and or folders on the system and also based on the result they can also edit the files or folder on the system. They can manage files and folders through their accounts. According to the survey the system also has a user-friendly interface because all of them agreed that the system storage is easy to use. All files that the users stored in the system surveys says that they can backup and restore all the data that is accidentally deleted. Also, according to the survey, the system can be accessed through mobiles devices such as laptops, tablets and or mobile phones. The evaluators agreed also that they can access the system through wired and wireless network. The evaluators agreed also that their time of uploading files are lessen in short, the system is faster in uploading files as compared to the other system that they are using. Based on the result of the proponents' survey they received a 93% of acceptance for the system and the effectivity of it reflects from the survey form above 7% of it are in negative feedback to the question because they need some practice and some idea about the system.

Table 3. Survey Result on the Features of the Proposed System

QUESTIONS	YES	NO
Can you access the network-attached storage over the network?	20	0
Is there an authentication procedure before accessing the network-attached storage?	20	0
Can you access your files over the network?	20	0
Can you create file/s and/or folder/s within your assigned folder?	20	0
Can you edit your own file?	20	0
Can you access files that are shared with you or with other users?	20	0
Does the facility allows you to access files or folders that are not yours or not shared to you?	0	20
Did the user easily understood the process of managing files in the network-attached storage?	19	1
Does the storage facility allows storage of different file types?	20	0
Is the storage facility easy to use?	20	0
Did you feel that the storage facility secures your files accordingly?	20	0
Does the storage facility allows the backup and restoration of the files and/or folders stored?	20	0
Can the storage facility be access in mobile devices such as laptops, tablets and/or mobile phone?	20	0
Is the storage facility be access either through wired network or wirelessly?	20	0
Does the system have fast upload time than other storage system? Would you recommend the use of this network-attached storage facility for the ease and security of handling and managing files?	20	0

5 Conclusion and Recommendation

Network Attached Storage is an operating system that is employed in the proposed project local open-source network attached storage. The proposed project is an appropriate solution in the current storage problems in the basic education department. The local open-source network attached storage resolves the issues of the storage in San Carlos College basic education department. The principal/administrator, coordinators and users can manage their files in their assigned folders and also, they are contented that the files that they stored is secured since files and folders of admin and coordinators cannot be accessed by others. Based on the result of the proponents' survey they received a 93% of acceptance for the system and the effectivity of it reflects from the survey form above 7% of it are in negative feedback to the question because they need some practice and some idea about the system

The Basic Education Department of San Carlos College need to upgrade their storage. Because they are using CD (compact disk) as their storage it has no security type of system for them to keep their files safe.

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