

Cloud-based Storage System with Voice Assistance

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Abstract

The concept of cloud computing has become more popular in the last few years. Data storage is a very important and valuable research field in cloud computing. The use of cloud-based storage systems for personal use has increased substantially over the past few years. These storage options generally allow the storage and retrieval of data online. These file storage systems help people from different domains to store, access, share and edit their files online reliably. We have developed a similar web-based application for a cloud-based storage system with an inclusive design. This paper discusses the features of the project to create, store, share, edit folders and files stored on the storage system and its inclusive design to enhance user experience.

Keywords: *cloud, storage system, cloud-based storage system, voice assistance*

1. Introduction

Cloud storage is an ever-growing technology that is been widely accepted in every sector owing to the attractive features that it has to offer. The use of a cloud-based storage system overcomes the limitation of local storage of accessibility which is extremely important in this age of data. This increased accessibility lets people travel around without having to carry their devices everywhere they go. The proposed cloud-based storage system provides file storage and synchronization service. With this storage system, user can store their files on the cloud up to any size to free up space on the local device and get access to those files from any device anywhere. Users can get access to their account on any device by simply entering the login credentials of their account. The users can upload new files to their account from any device, edit text files online, share their files with other users or delete them.

Security is one of the major concerns when it comes to storing data on remote devices as it needs to be transferred to and fro often. The users don't have to worry about security since the files are encrypted during transfer as well as storage. This ensures that the data is not liable to be

intercepted by unauthorized parties. This keeps the users' data safe from malevolent parties.

The file-sharing feature allows users to share files from their accounts to other users' accounts. Changes to the files can be made online from one device and it will be reflected in all the devices on which the account is logged in. This synchronization ensures the consistency of an account across all the devices. The storage system also has a voice assistant for enhanced user experience. This also makes the design of the proposed storage system inclusive.

2. LITERATURE SURVEY

There are few widely used cloud-based storage systems available. These systems offer some features that are common to all systems shown by Zenuni, Xhemal & Ajdari, Jaumin & Ismaili, Florie & Raufi, Bujar [1]. Drago, Idilio & Mellia, Marco & Munafo, Maurizio & Sperotto, Anna & Sadre, Ramin & Pras [2], and Asst. Prof. Krisawan Prasertsith, Penjira Kanthawongs, Ph.D. and Tan Limpachote [3] showed that to use the storage system users have to create an account. Data can be uploaded from the local devices on the cloud and the servers are responsible manage where and how this data is stored. The account can be accessed from any device anywhere which in turn gives access to all the data stored in the account. The files can be edited and the changes are updated ensuring consistency across all the devices. The feature to share these files is also available. Users with whom the files are shared can work in collaboration with multiple users. Any type and any number of files can be uploaded as long as the user does not run out of storage space available on their account. To make storage space previous files can be deleted or the user can opt subscription option that provides more storage space according to their requirements. A new storage system proposed by Prof. Rohini Patil, Tanvi Nerurkar, Shivani Patil, Asawari More. [4]

As the storage systems are cloud-based the drawbacks of cloud storage are induced in the systems. A study done by Andree E. Widjaja, Jengchung Victor Chen, Badri Munir Sukoco, Quang [5] showed people that would be willing to use Cloud-based storage system for sensitive data. Data security is one of the biggest concerns of cloud computing as shown by Kamalakannan, T & Senthil, K.Sharmila & Shanthi, C. & Radhakrishnan, Devi [6]. Bindu, B. & Balagoni, Yadaiah in Secure Data Storage [7] and Liu, Kun & Dong, Long-jiang [8] studied that for cloud-based storage systems to deal with this concern it is important to store the files after encrypting them so that even if an unauthorized person somehow gets to the files they are not able to read them. These stored files are frequently moved from one device to another. Attackers might try to intercept the network to try and get data while transferring. Encrypting data for sharing files makes the system immune to these kinds of threats. The design of these cloud-based systems can be modified to make them more inclusive in terms of their

user base. Multi-model HMI can be incorporated to achieve this.

3. METHODOLOGY

We have developed a Storage system that is easy to access and use. Any type of file like text, doc, audio, video can be stored. This allows to conveniently store all the files in one place without worrying about the storage space. Security is one of the major concerns for cloud-based storage systems is taken care of with encrypting the files for storage and sharing. The addition of voice assistance makes our design inclusive to visually impaired users. This makes the application with multi-model HMI for other users. This feature enhances the overall user experience.

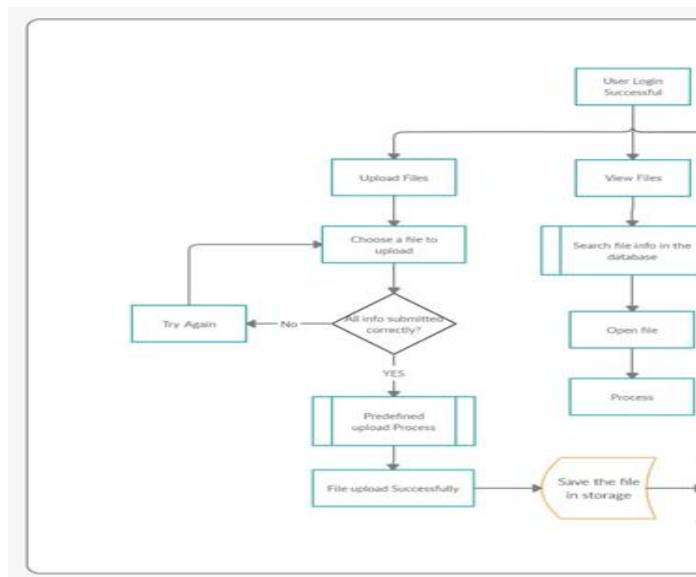


Figure 1: - Flowchart

3.1 LOGIN

To access the services provided by our web-based storage system it is necessary to create an account. Here sign-up can be done by providing all necessary information or simply choosing the option to sign up with an already existing Google account. Once an account is created it can be logged into from any device to get access to all the

files stored on the account. After logging in the feature provided by our system can be availed.

3.2 UPLOADING FILES

There is an option to upload files from the local store which allows users to store any type of file on their account. With a proper internet connection and after checking for enough available space the file is uploaded. It is taken to a server on the network which takes care of storing the file at a suitable remote location and its replication to ensure fault tolerance. Other information about the file is updated in the backend database table like the file name, file time, uploading date and time, and storage location of the file. After the backend process is completed, the uploaded file is reflected in the user account across all the devices wherever the user account is logged in. the space occupied by the uploaded file is added with the already uploaded files and the remaining available space for the account is recalculated and dynamically updated.

3.3 VIEWING FILES

The uploaded files can be viewed online from any device without having to download any specific software on the local device. To view a file user can look for it using the file name with the search option. The name of the file is searched in the database table if the file name is found it is retrieved from its remote storage location for which the URL is stored in the same table as a file name. Even though the file may be stored in various chunks at different locations its retrieval is very efficient and seamless to users. These files are opened in view-only mode. There is also an option to edit text files online on the system itself.

3.4 SHARING FILES

Sharing files is also an easy task. Any type of file stored on the account can be shared with any number of other accounts. URL of the file is shared which allows other users to access the file. Users with whom the files are shared are notified via email. The user does not need to download the file they wish to share on their local storage device. While sharing a particular file its URL is taken from the database table. The user has to specify

with whom they want to share the file with and only those users are allowed to access the file. A table maintained at the backend that stores which files are shared with which users. When someone clicks on a link to a shared file the backend table is checked to verify whether the user has been given access to the specific file. Only after verification further process of retrieving the file takes place. This ensures only the intended users get to access the shared file. The file is also encrypted when shared so the data is not liable to be intercepted by unauthorized parties. This keeps the users' data safe from malevolent parties.

3.5 DELETING FILES

The uploaded files can be deleted to free up space or simply because the user doesn't need them anymore. The files that are deleted, removed from their remote storage location. The file to be deleted is looked for in the database table and the storage space location where the files and their replications are stored is freed. The process for deletion is quite similar to viewing files just instead of retrieving the file from the stored location it is deleted. Once a file is deleted all the records related to that particular file are deleted from all the database tables. The available free space is recalculated and dynamically updated in the user account.

To make the design inclusive we have integrated with voice assistance. This feature is most useful for visually impaired users. This voice assistance can be used to navigate through the application efficiently. This also enhances the overall user experience.

Users can organize their files by creating folders, folders within a folder, star marking important files for quick access. The files that are deleted, first taken to the trash before permanently deleting. These files in the trash can be restored if needed. This improves forgiveness of human error of accidental deletion of files. When the files are deleted from trash only then they are permanently deleted and cannot be restored anymore.

4 RESULTS

A survey was conducted to test the proposed storage system where users used our storage system and give feedback based on their experience. The survey was conducted on a mixed user pool of around a hundred users. The feedback from the users helped us do a qualitative analysis from a user's perspective. The survey had three sections viz. working of the features provided, voice assistant, and overall user experience. The scale of 1-5, 1 being poor, 2- bad, 3-good, 4-very good, 5-excellent

4.1 FEATURES

In this section, users gave feedback based on the usage of the features. ie uploading, sharing, deleting, restoring files.



Figure 2. Features Feedback result

The results showed a vast majority (over 90) of users found the working of these features very good which was 4 on the scale of 1-5. Some improvements can be made to increase the ease of sharing features

4.2 VOICE ASSISTANCE

For this section users were asked to navigate through the application only using voice assistance. Voice assistance is one of the important parts of the application that had to be surveyed separately. This section aimed to check the

efficiency of voice assistance i.e. the voice command should be as short as possible with no verbosity and accuracy of the voice assistance i.e. the voice commands given should be executed without any error.

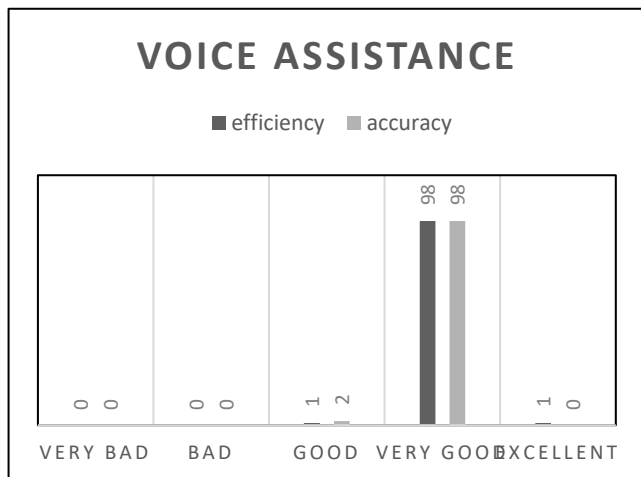


Figure 3 Voice Assistance Feedback results

The results showed that the vast majority of users found both the efficiency and accuracy to be very good but there were some users (<10) who found the the voice assistance just satisfactory. There is scope for improvement in this section.

4.3 USER EXPERIENCE

User availability of multiple options for similar applications user experience becomes of paramount importance. An application cannot be considered good with a decent user experience. The design was kept intuitive to ensure a smooth user experience. This section focused on user experience offered by the application.

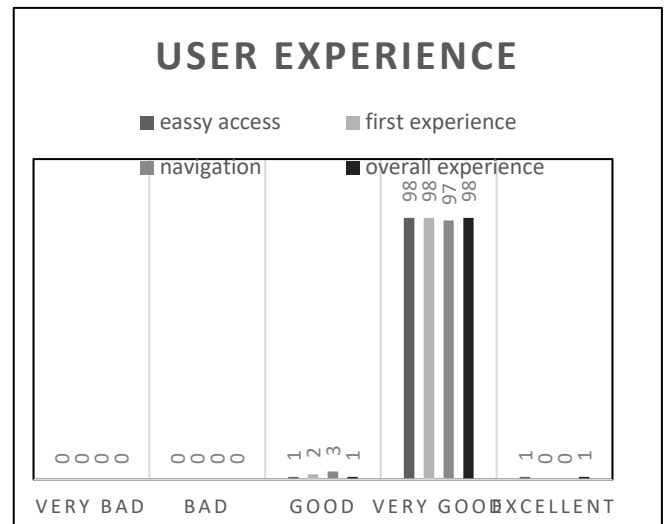


Figure 4 Voice Assistance Feedback results

Results of this section indicate that most of the users had to major problems using the interface of the storage system. With some improvements in the interface design best user experience can be offered

5. CONCLUSION

The main aim of the project is to develop a cloud-based path independent software on which we can store data securely and can access it any time we want. Users must log in/sign-up with valid credentials to store their files and data on our website. Users can create a new text file, upload a document, upload movies/ audio files, view and download all the data. The file-sharing feature allows multiple users to access files from the account, wherever they may be. This feature is very useful for people who need other people to be able to view some or all files stored on the account. The files would be encrypted during transfer as well as in storage. This ensures that the data is not liable to be intercepted by unauthorized parties. This keeps the users' data safe from malevolent parties. The inclusive design approach is one of the main features of the project that overcomes the limitation of the already existing storage system.

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