



Online File Storage System

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Abstract - As computers become an increasing part of our lives at work, at home, and even while traveling, the growth of Internet has brought about revolution to our daily lives with sophisticated online applications that provide us with tremendous ease of communication. Internet offers a number of services ranging from mail server, list server to web-based workgroup tool. With the increasing need to transfer and store digital data, web-based file storage options has become popularize among web communities. A variety format of storage opportunities is available over the net, from free web page servers to online photo galleries and online personal storage space. These storage options generally allow the storage and retrieval of data online. While most of these sites continue to focus on offering free web site and homepages, we have developed an online virtual space file storage system. This system is particularly customized to university and college communities. The file storage system helps people from different domains (e.g. students and lecturers) to manage, access, share and backup their files online, easily, efficiently and reliably. This paper describes some of the features implemented in this system as a solution to juggling floppies, storage limitation and unreliable copies of data.

Keywords: Internet Applications, Online File Storage System

1. INTRODUCTION

The Internet is exploding like wildfire, with the Web doubling in size every few months, making it the fastest growing service on the global Internet. Internet is defined as a worldwide interconnection of tens of thousands of computer networks linking tens of millions of computers, peripherals such as printers and large hard disk assemblies, as well as communications equipment, including wiring, satellites, routers, repeaters and switches [1]. The Internet was originally developed to provide easy communication and transfer of information among academic and government agencies. Over time, the Internet has expanded into a universal information utility that provides a myriad of sophisticated and powerful services. [2].

As online files become more sophisticated, web-based file storage options has become popularize

among web communities. There are many free online storage services in a variety of formats. Oldest of all are the free Web page servers, such as Xoom, Tripod and Geocities, which allow the hosting of organization or individual web pages for business objective or personal interest. The online photo gallery facilitates the uploading of pictures from digital cameras or previously scanned image to their own sites. And recently, the general online storage options that accept the storage of any type of file format, has gradually reached out to most web communities [3].

While most people are familiar with the usage of floppies to transfer and store data, nevertheless such traditional way of transferring data by means of floppy disks has posed a lot of disadvantages, such as limited storage capacity, vulnerability to virus attack and unreliable and inconvenient retrieval of files. As one way to solve these problems, we have developed an online file storage system called UniFile, customizing particularly to university and college communities.

UniFile is a system that can assist people from different domains, for example students and lecturers, to manage, access, share and backup their files online, efficiently and reliably. Both students and lecturers can leverage the use of the Internet to save their files in the remote server and to use the system to access their files without any hassles or limitations from absolutely anywhere.

The technologies used in developing UniFile are Microsoft Active Server Pages and Microsoft SQL Server 7.0 as the tools to develop UniFile. The server side requirements for UniFile are Windows NT4 or 2000 running IIS, Microsoft Data Access Component (MDAC) 2.5 + and SQL Server. Whereas for the client side requirements, Internet Explorer 5.0 + is required with javascript and cookies enabled.

In the section 2 paper, we will describe the features of the online system, highlighting its usefulness and flexibility. An overview of the application will be presented and the design and implementation process of UniFile development will be touched briefly. In section 3, we would like to relate the lessons learnt and experience gained throughout the research and development process. Eventually, we will give a conclusion to this paper in section 4.

2. UNIFILE – ONLINE FILE STORAGE SYSTEM FOR UNIVERSITIES AND COLLEGES

This section describes the development process phases of the UniFile; the system analysis, design, and implementation.

2.1 System Analysis

UniFile features are basically divided into four main aspects. Out of the four, two aspects that play the most significant role are: (i) File Storage and Management (ii) File Sharing. The remaining two aspects are: (i) Personal Management (ii) Online Student Activities. We will begin by introducing the File Storage and Management features.

Students or lecturers who wish to utilize the online file storage service must acquire an account in the system. Thus, by selecting the domain he or she is in (see figure 1), the user is required to go through a simple registration process to create a new account. For lecturer, verification code is required to distinguish between a lecturer and a student.

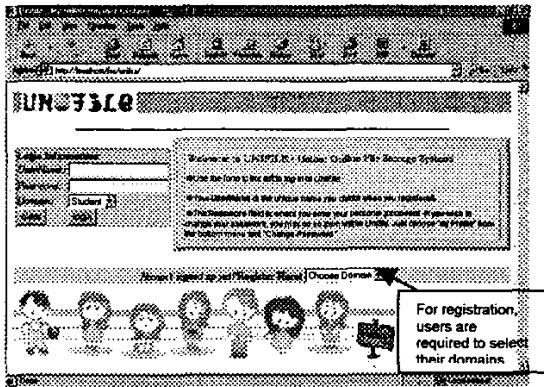


Fig. 1. The Login and Registration Page

User is required to login into UniFile each time they wish to use UniFile by entering their username, password and specifying the domain they are in. By default, upon registration, a student will be given a storage space of 5MB and a lecturer with 10 MB. A folder named Inbox is automatically created for each user, which serves the purpose of receiving files sent by other UniFile members. This is rather similar to the function of the inbox in an email service. The interface of UniFile is easy-to-use and graphical, with some similarity with the Windows Explorer or the MacOS interface. In the left pane of the screen, shows a drive space meter and a tree view displays of all folders in the user's storage space. In the right pane, the detailed listing of files and folders will be displayed, as shown in figure 2.

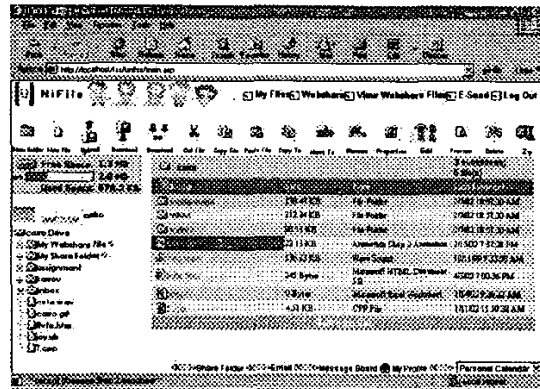


Fig. 2. The Student Domain Main Page

All the files and folders in the user virtual storage space are displayed in a listing style that includes the name of the file, the size of the file in KB, the type of the file and the date when the file is last modified. Sorting is allowed for each header of the list (name, size, type and date). For better readability, two colored highlighting is used.

A row of instantly recognizable graphical tool buttons, as shown in Figure 2) spans across the top part of the screen. These tools perform simple yet powerful functions, by assisting user in managing and organizing their remote online files with few simple mouse clicks. They are 16 functions altogether, namely: New Folder, New File, Upload, Download, Zip Download, Cut, Copy, Paste, CopyTo, MoveTo, Properties, Rename, Preview, Edit, Delete and Zip (see



Fig. 3. UniFile File Managing Tool Buttons figure 3).

To upload single file each time to one's remote folder would have been a tedious task. By enabling the user to multiple upload five files at once will save the user's trouble from waiting for one transfer to finish before initiating another, as in figure 4). To enable faster transfer, zip download feature is supported so that file downloaded is compressed. It works similarly like the standard download, but the file is compressed into ZIP file before downloading.

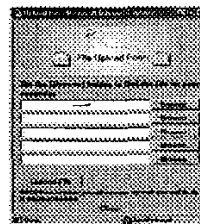


Fig. 4. File Upload Form

Comprehensive information about each and every user's file, such as the type, size or creation date and time of the file, can be viewed by clicking the Properties tool in the toolbar. To know how much

space the user has used and how much it is remaining, a Drive Space Meter is designed at the left hand corner of the screen (see figure 2) to serve the purpose of monitoring the utilization of the space in each user virtual drive. On top of that, the system supports the viewing and editing of files with certain extensions. Files that can be viewed from within the web browser include those with the extensions of gif, jpg, jpeg, png, bmp, jpe, htm, html, doc, ppt, xls, txt and swf. Whereas file extensions that are accepted for editing include htm, html, asp, asa, txt, inc, css, aspx, js, vbs, shtm, shtml, xml, xsl and log.

A student and lecturer domain in UniFile have slight distinction in terms of two aspects, the interface and the space allocated. In general, the page for Lecturer has similar functionality and features as with the student's except that lecturer has one privilege over student: Lecturer owns larger storage space as compared to student's. Aside that, the interface of Lecturer page is relative simple and uses technology color. Whereas, the student page's interface is brighter and livelier in colors.

Many people have the general conception that an online file storage system is basically used for the storage and retrieval of personal files. Nevertheless, nowadays, web communities are about sharing information. Thus, in UniFile application, we have incorporated several file sharing features, which we named it as websharing.

Every UniFile user can webshare their files in their personal folder. Webshared files are files to be shared by all UniFile members. All webshared files posted will be displayed in a page for view by all users. Pagination and sorting function are included for easier viewing. Brief description for each file is provided and UniFile member are free to download any files they want. User can also view the properties of any file, or view the contents for certain files. A search function is located at the top corner of the page to facilitate the user in search for any webshare file.

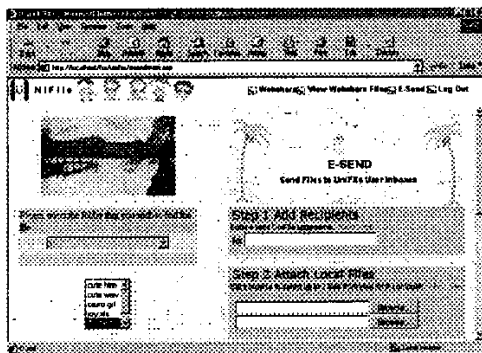


Fig. 5. Esend Page – transferring files to other UniFile

With UniFile, students no longer need to submit their assignments by floppies to their respective lecturers, instead they can send the file to the lecturer's inbox from within their UniFile remote folder or from local drive. This special function is called E-send (see figure 5), a function to facilitate the user in sending remote or local files to other UniFile users' inboxes. A whole listing of all the folders and files in the user's

remote folder is displayed in the left pane of the screen for user selection. Addressing the intended recipient is done through entering the recipient's username. Before hitting the E-send button, user can choose whether to leave a message to the recipient in the message column.

Some students would have prefer to share their files within a group or small circle of peers. Thus, a folder sharing function is allocated to allow user to share any folder in their personal storage space with any friends they wish to add into their sharing lists.

As a student, we constantly need to be reminded of certain important events, such as the date of submission for assignments and projects, quizzes, tests or date of final examinations. Thus, in UniFile we create an easy-to-use personal calendar which can act as an online organiser to UniFile users. The calendar is divided into two types, namely basic calendar and advance calendar. The calendar will allow the students to view upcoming events ranked by importance or date or color coded in calendar format. By frequently checking and maintaining an accurate calendar, user will be constantly reminded of their deadlines or appointments, thus minimizing the chance of missing any events.

Besides storing, and sharing files, we include some online activities to complement the usage of UniFile members. These activities, though not directly related to Online File Storage System, however are indeed useful for web communities. In a student community, we like to post up message or questions for discussions and look forward to receive answers and feedbacks from others. So by hosting a message board, UniFile members can assign his or her own boards for discussions or post up any upcoming news or society announcements.

To send a quick mail to other UniFile members can be done through a simple mail function created using JMail. HTML format of email message is supported and user can choose to attach a local file to his message.

Finally, for security concern, a log off button is provided for the user to close their connection to the UniFile server when he or she has finished with his current session. This prevents another user from accessing his or her account, if the user is working on a shared computer. A security feature is further added to automatically log off UniFile when the user remains idle for a period of 30 minutes.

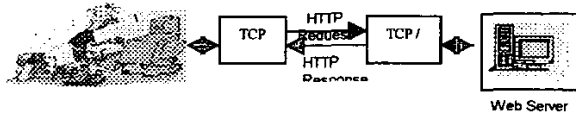
2.1 System Design

In this section, we will describe the system architecture and design of UniFile.

The World Wide Web is based on the Hypertext Transfer Protocol (HTTP). This protocol defines how a client browser will request a document from a web server once it has connected via sockets [4]. Figure 6 shows the protocol layers used in an HTTP request.

Before a user (client) can access the UniFile website, he must first have the connection to the Internet to fire up his web browser. A client browser connects to a web server using TCP/IP on port 80. When the client enters the UniFile's URL, the user's

browser then makes a connection to the domain name service (DNS) and if the address is entered correctly, the client's browser will then request a socket connection to the HTTP "host".



Client Browser Fig. 6. Connecting to UniFile web server

Once the socket connection is successfully established, the client's browser communicates with the web server using HTTP. When the web server receives the page request, for example default.htm from the client browser, it returns a HTTP response.

For UniFile, we have chosen ASP and SQL Server as our development technology. ASP is one of the powerful site-server technologies and is a solution to providing a framework for building dynamic HTML pages that enable UniFile application to be interactive. SQL Server is chosen as the database solution for UniFile instead of Microsoft Access due to its high performance and capability in supporting high volume transaction processing as well as its full integrity with Microsoft's Internet Information Server.

2.2 System Implementation

The implementation of UniFile commences with setting up the development environment for UniFile. A server to hold the files is allocated and the IIS server is configured to host the site for UniFile. We create the SQL database for UniFile and make the connection to SQL server through ODBC in order to access the database from within the Active Server Pages.

Based on the conceptual data model constructed during database design, we create the respective tables to hold all data and information of the UniFile's users and files. The modules for UniFile are then coded. We use the File Access Component to work with files and to gain control of the file system of the file server. This component uses objects like FileSystemObject, TextStream, File, Folder and Drive. The FileSystemObject is used to deal with the creation and maintenance of a file or folder and it includes a number of methods for working with files and folders, such as CreateFolder, CreateTextFile, DeleteFile etc.

The uploading function for UniFile is developed using pure ASP instead of using any upload components that is currently available in the market. It has one advantage over any upload components, as it will work on any web server that supports ASP since no components are required to be installed.

3.0 EXPERIENCES AND DIFFICULTIES

In all ways, it has been a valuable experience in developing the Online File Storage System. Many lessons were learned and knowledge gained throughout both the research and development phases. We have strengthened and deepened our skills in ASP programming by having a greater insights into the

features and complexities of Active Server Pages, especially in dealing with the file system. Nevertheless, there are times where problem and dilemma are encountered. It is rather a tough time to determine the best features for the application and deciding the suitable techniques and application programming to be used, sometimes we face difficulties while coding and integrating the modules.

4.0 CONCLUSION

The Online File Storage System (UniFile) is initiated by the problems faced by students in university and colleges while utilizing the computer laboratory and transferring the files back home using floppy disks. We sought to overcome the problem by having an online file storage system which allows them to store and retrieve their file. Besides orienting to the student's requirements, UniFile is suitable for usage of lecturers, as well as any other web communities.

The development of UniFile will continue to expand from time to time, with more functionality to add-on as the needs of the web communities continue to grow and differ. The security aspect of the system has yet to be strengthened and taken care of. It is always a concern for students whether their files stored in the remote server are secured and whether the security of their virtual drive is not being breached by unauthentic hackers. On top of that, new and enhanced file-sharing features will be included from time to time to further facilitate the UniFile users in their file sharing activities.

Last but not least, it is hoped that the new system will fully benefit all users in terms of remote access, file sharing and online backup, and thus bringing satisfaction and productive results to all web communities.

5.0 REFERENCES

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