# File Management System using DFS Algorithm and Java Technologies

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**Abstract:** *In this paper, we present a file management system that uses the DFS algorithm to search and traverse the files in your system. File management system is a desktop application which is developed by DFS algorithm and Java technologies. The application provides users with the ability to create excel sheets and search files and organise them based on user requirements. The file management system is implemented using java technologies, including File class, Apache POI and Java Mail. The DFS algorithm and Java technologies are used to provide fast and evaluate the system performance by conducting experiments to measure its speed and organising files.*

**Keywords:** DFS Algorithm

## I. INTRODUCTION

File management systems are essential tools that help users to create excel sheets, search files and organise files efficiently. In today's digital world, users generate large volumes of data in various formats such as documents, images, and videos. Managing these files can be a daunting task, especially when they are bulk in your devices or storage media. The need for an efficient file management system is paramount to ensure easily search your files and organise your data or files [8,9,10].

In this paper, we propose a file management system that uses the DFS algorithm and java technologies to create excel sheets or list files, search and organise them based on user requirements. The application is created by using Java technologies, including the File class, Apache POI and Java Mail. The application [11,12].

provides users with the ability to list files, search files, and organise them in their subfolders. The DFS algorithm and java technologies are used to provide fast and efficient search files and organise files. The application is designed to be user-friendly and easy to use [8,9].

File management is an essential task that needs to be performed by computer users on a regular basis. With the increasing amount of data and files that need to be managed, it becomes a challenging task to organise in their subfolders [10,11].

In this research paper, we present the implementation of a file management system using the DFS Algorithm and Java technologies which is to create excel sheets, search files and organise them for user needs. The application is designed to perform tasks such as search files, list files and organise files. The implementation uses java 8, POI API, java JFrame, java mail API and visual studio code editor [12].

## II. BACKGROUND KNOWLEDGE

**1. What is File System:**
The file system is a technique or way used by an operating system to store, organise and manage files and data on your computer or storage devices. It provides a way to manage, store and retrieve files and folders in a structured manner, allowing users to access and manipulate data stored on your storage devices such as a hard disk, SSD, USB drive or network-attached storage(NAS) [1,2].

The file system is a method used by our computers and operating systems to store files and organise files and data or information on our storage device such as solid-state drive, USB drive and hard disk drive. These file systems provide a structure for organising and managing files and directories, as well as managing access to them and it is responsible for maintaining the integrity of data stored on your storage device [2,3,4].

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File system is also responsible for managing file permission and access control and provides a user-friendly interface to accessing and managing files [8,9].

The file system typically consists of directories that are also called folders and file systems typically have permissions and access controls that determine who can write,read,delete and execute files and directories. There are more ways to manage files but the choice of file system depends on the operating system being used and the type of device and intended use,as well as security requirements and performance [4,5].

## 2. How File System work:

The file system provides a way to access and manipulate the data and working of the file system is organising data into files and directories, file system works can vary depending on the type of file system and operating system [8,9,11].

Whenever a file is created, the file system is assigned to a unique identifier and that is called inode. Inode contains metadata about the name of file, size of the file, size of the file and location on your storage device [8,9].

The file system also provides a concept to manage and organise files into directories which is created in the hierarchical structure [8].

When the user accesses a file then the file system uses the directory entry to locate the inode and retrieve the files data and information from our storage device. The file system manages the data which is stored very efficiently and without fragmentation and location of the files on our storage device which ensures that data is stored [8,9].

The file system also performs checks to ensure that the user has permission to access the file and data or information are not currupted. File system also performs maintenance tasks such as checking for errors and optimising storage space [3,4,5].

When a file is created or modified the file system updates the inode and directory entry accordingly. File system directories can contain files and other information allowing users to easily navigate and find the files that are needed [3,4,5].

The file system has security features that control access to directories and files. It has permissions to determine who writes, reads, deletes and executes files and directories and access can be restricted based on user groups or accounts [4,5].

Overall, the file system is a critical component of any device or operating system and it provides a way to organise, store and manage data on our computer or storage device. The file system provides a structured and organised way of managing data and information on a storage device which allows users to easily access, create and modify files as they are needed [8,9].

## 3. File access method

File access methods refer to the techniques or concepts used by the file system to locate and read and write data stored in files. There are different types of file access methods which are sequential access, direct access and indexed access [8,9,10].
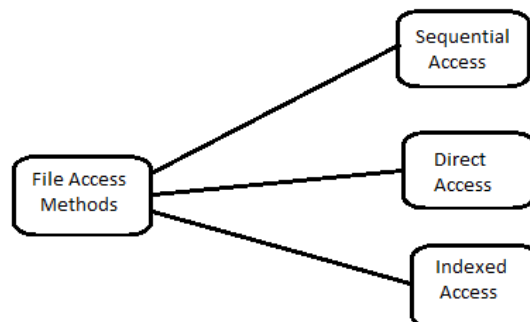


Fig.1: File Access Method Diagram

**Sequential Access**

Sequential access is the file access method which is used to read the data and write data sequentially in a sequential manner and it is started from the beginning of the file to the end of the file. In the sequential access method the data can not be accessed randomly and the data only accessed in that order that was written [8,9,1].

Random access is typically faster than sequential access in which data can be accessed in any order and sequential access can be more efficient for processing large volumes of data that are stored sequentially [8,2,4].

The primary method of the file access method is sequential access method which is to access the data stored in our computer files and sequential access method is read and access sequentially from beginning of the file to the end of the file one record at a time [8,5,6].

To understand how sequential access works, consider an example of a file containing a list of student names and their corresponding grades. Suppose the file is stored on a hard drive and contains the following records:

```
Name Grade
------------------------
John  A
Mary  B
Peter C
Sarah A
```

In sequential access, when reading the contents of this file the computer or device starts reading the first record of the file which is 'John A'. After reading this record the computer proceeds to the next record in the file which is 'Mary B'. This process continues until the computer or device reaches the end of the file and at which point the entire contents of the file have been read [8,9].

One of the main advantages of sequential access of the file access method is its simplicity. Since data is stored and read sequentially the system does not need to keep track of the location of individual records [8,4,7].

Using sequential access the system reads or writes data sequentially from the beginning of the storage medium until it reaches the desired things and in this process continues until the required data is found. Commonly sequential access methods are used in situations where the data is written and read in a specific order [8,6,7].

In conclusion, sequential access is a simple and effective method of accessing data stored in computer files or our storage device . While it may not be the most efficient method for large files, it is particularly useful when working with smaller files and data that does not need to be accessed randomly [8,9,5,6].

**Direct Access**

Direct access is the file access method which is data write and read randomly from any location in the file and this access method where data can be accessed directly using a file pointer. Direct access is also known as random access and another method of accessing data stored in our computer files [8,9].

It is commonly used in applications where data needs to be accessed randomly such as a database application. Direct access refers to a method of accessing data in a file or document where each record has a unique number or unique identifier or key [8,2,4].

Using this identifier a program can directly access a specific record in the file without having to read through all the other records that come before it and as would be necessary with sequential access. Direct access is commonly used in database systems where the ability to quickly access specific records is crucial for efficient data management. Direct access is particularly useful when dealing with large files and when accessing specific records within those files. It allows programs to access data more efficiently and quickly than they would be able to with sequential access [3,4,6,8,9,10].

One of the most common ways to implement direct access is through the use of an index file which contains pointers to the locations of individual records within the main data file. When a program wants to access a specific record, it first looks up the corresponding pointer in the index file and then uses that pointer to directly access the desired record in the data file [8].

To understand how Direct Access works, let's consider the same example of a file containing a list of student names and their corresponding grades. Suppose the file is stored on a hard drive, and we want to access the record corresponding to "Peter C." In Direct Access, we can access this record directly without reading through any of the previous records [3, 6,8].

One of the main advantages of Direct Access is its efficiency. Since users can access any record in the file directly, the system can retrieve the desired data quickly and efficiently. This makes Direct Access particularly useful when dealing with large files containing data that needs to be accessed randomly.

Direct Access also has its limitations. One significant disadvantage is that it requires additional overhead to manage the Record Pointers, which can increase the file's size and complexity. Additionally, Direct Access can be more challenging to implement than Sequential Access, especially for large files with complex data structures [8,4,5].

In conclusion, Direct Access is a powerful method of accessing data stored in computer files. While it may not be the most efficient method for small files, it is particularly useful when working with large files and data that needs to be accessed randomly. By using Record Pointers, Direct Access enables users to retrieve data quickly and efficiently, making it an essential tool for modern file management systems [1,3,7,8].

**Indexed Access**

Indexed access is a file access method where data is read or written based on an index or key value. In this method, an index or key value is associated with each record in the file, and the file system maintains an index table that maps the index value to the physical location of the record in the file [2,4,8].

Indexed access is commonly used in applications where data needs to be accessed based on a specific search criteria, such as a database query.

Indexed Access, also known as Indexed Sequential Access Method (ISAM), is a file access method that combines the advantages of both Sequential and Direct Access methods. In Indexed Access, records are accessed sequentially, but the system uses an index structure to locate the records quickly and efficiently [3,5,8,9].

To understand how Indexed Access works, let's consider the same example of a file containing a list of student names and their corresponding grades. Suppose the file is stored on a hard drive, and we want to access the record corresponding to "Peter C." In Indexed Access, we can access this record by using an index structure to locate it quickly and efficiently [8,9].

The index structure in Indexed Access is a separate file containing a list of Record Pointers, each corresponding to a specific record in the data file. The index file is typically much smaller than the data file, making it more efficient to search and manage.

To access a specific record in the data file using Indexed Access, the system first reads the index file to locate the Record Pointer corresponding to the desired record. Once the Record Pointer is identified, the system uses it to locate the physical location of the record in the data file, and then retrieves the data contained within it [4,6,8,9].

One of the main advantages of Indexed Access is its efficiency. Since the system uses an index structure to locate records quickly and efficiently, Indexed Access can be more efficient than Sequential Access for large files with complex data structures. Additionally, Indexed Access can handle random access to data with minimal overhead, making it useful in many applications.

However, Indexed Access also has its limitations. One significant disadvantage is that managing the index file requires additional overhead, which can increase the file's size and complexity. Additionally, Indexed Access can be more challenging to implement than Sequential Access, especially for large files with complex data structures [1,2].

In conclusion, Indexed Access is a powerful method of accessing data stored in computer files. By using an index structure to locate records quickly and efficiently, Indexed Access enables users to retrieve data with minimal overhead, making it an essential tool for modern file management systems. While it may not be the most efficient method for small files, Indexed Access is particularly useful when working with large files and data that needs to be accessed randomly [3,5,8].

Overall, file access methods provide a way to access and manipulate data stored in files. The choice of access method depends on the type of application and the requirements for accessing and processing data.

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## III. OUR USED ALGORITHM FOR FILE MANAGEMENT SYSTEM

### DFS Algorithm

The Depth-First Search algorithm is a very important algorithm for searching and traversing any node which is in the graph or tree data structure. The DFS algorithms start from the source node of the graph data structure or tree data structure and explore all nodes in the graph or tree data structure [8,9].

How the DFS algorithm works in given below:-

1. First of all strat from the source node which is graph or tree data structure and this node is visited to mark it.
2. From the source node of the tree or graph, follow each branch and explore all branches and all nodes in the tree or graph.
3. Return to the previous node of the tree and explore additional branches of the tree until there are no more unexplored nodes to investigate from the current node of the tree or graph.

Until all nodes of the tree have been visited, repeat step 2 and step 3.

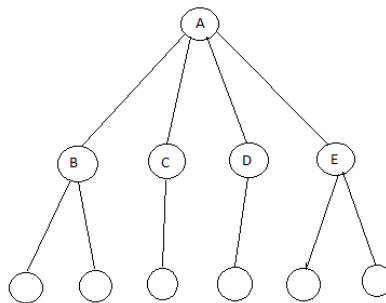Here is an example of the DFS algorithm in given below;-



Fig.2: DFS Algorithm Diagram

In this example, the DFS algorithm starts from source node A and explores as far as possible along the branch to node B and It then backtracks to source node A and explores the branch to node C before backtracking again to source node A and exploring the branch to node D. Finally, it backtracks to the source node and explores the branch to node E before finishing.

Overall, the DFS algorithm is a very important algorithm for searching or traversing graphs and tree nodes of data structure and it is a very powerful algorithm to use for searching and traversing [8,9].

## IV. IMPLEMENTATION

The Home Page of the application will contain all the three basic functionalities of the application which are listed below. There will be three buttons, On clicking over them the new screen will be open according to their functionality.
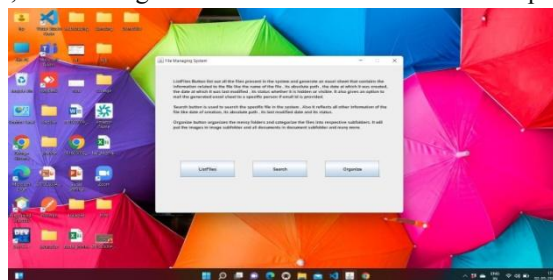


Fig.3: Home Page Image

### List Files

If you clicking the ListFiles button then the button work is list out all the files present in our computer or system and generate an excel sheet that contains the information or data related to the file like the name of the file and path of the file and the date at which it was created, the date at which it was last modified, its status whether it is hidden or visible. It also gives an option to mail the generated excel sheet to a specific person if email id is provided.

On clicking over the ListFiles button the new frame will open which will ask for whether you want to mail the generated excel file or not. We need to check the box accordingly if we want to send mail to that person.
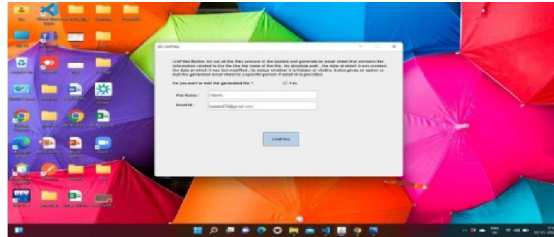


Fig.4: List Files Module Image

Here, if we uncheck the mailbox of the file in this case only the file will be generated and it will not be mailed in this case. The email id field should be in correct form otherwise it will show you an error for improper email id.
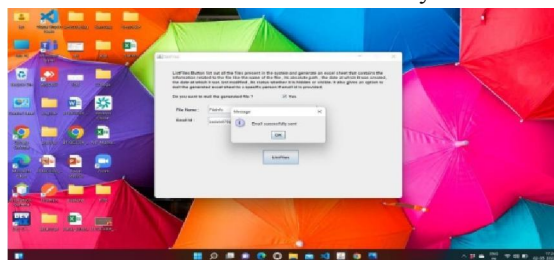


Fig.5: Before Process List Files Image

As we can clearly see that excel file FileInfo got generated now on the desktop . The excel file will look like below . The file contains all the related data of all the files present in our system or our computer.
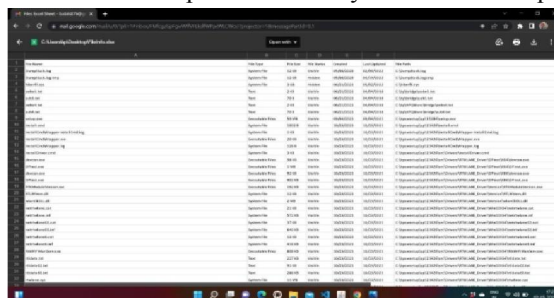


Fig.6: After Process The Excel File Image

**Search**

The second button is the search button and it is used to search the specific file in our computer or our system. And also it reflects all other information of the file like date of creation and its absolute path and its last modified date and its status.
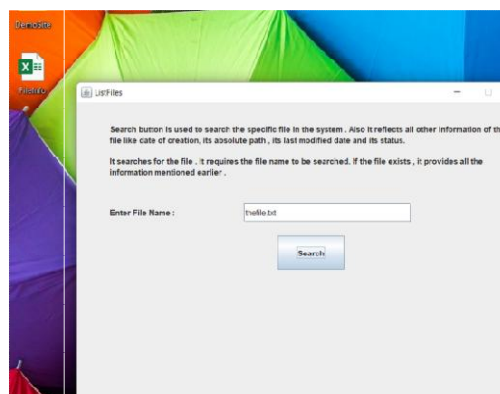


Fig.7: Before Search Image

On clicking over the Search Button , we need to give the name of the file name and it will search for the file locations of that file.
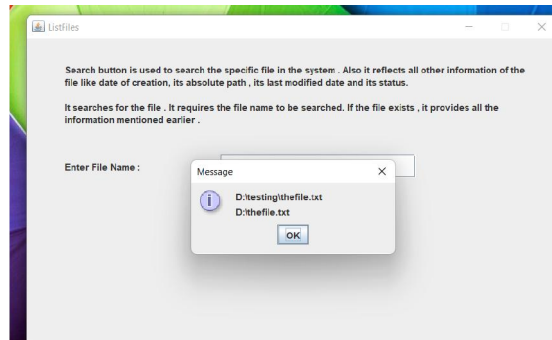


Fig.8: After Search Image

**Organise:**

The Organise button organises the messy folders and categorises the files into respective subfolders. It will put the images in the image subfolder and documents in the docx subfolder and all documents in the document subfolder and many more.

On clicking over the Organizing button, we need to give the path of the folder which is to be organised. Let initially we have a messy folder as given below.
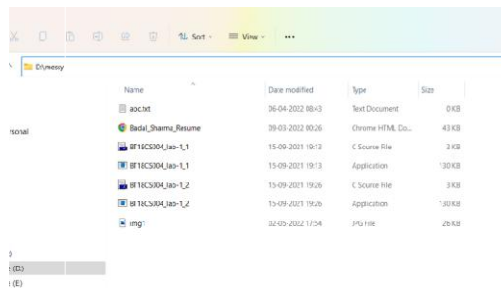


Fig.9: Before Organise Folder Image

Now we will copy its path and paste it in the asked field to organise.

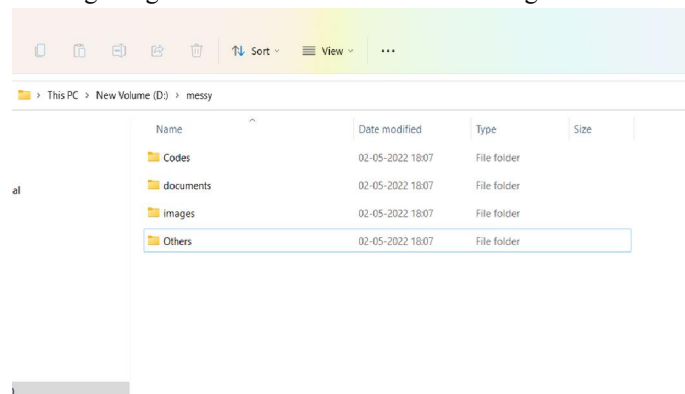After the operation, the folder will get organised in different subfolders like given below :



Fig.10: After Organise Folder Image

## V. COMPARISON

**Our Access Method vs File Access Methods:-**

In our access method, the file management system application is fast and time saving and a very powerful algorithm used to access files and organise them in their subfolders in the folder. The file access method is the method of accessing and organising and manipulating data and organising data into directories [8,9].

In our access method we used the Depth-First Search algorithm which is a very powerful algorithm for searching and traversing any file in our computer or system. The DFS algorithm is better than file access methods to reduce complexity for searching in our system.

In the file access method, the basic access method is also called sequential access method and it is access the file sequentially it means after one by one they do not skip anyone file in the sequence [1,3,6,8].

But our search option in the application functionality is much faster than sequential access method because the sequential access method is to access files or data in a sequence but our search functionality is to search files a few times and it is given the date of creation and last date of modifying and their absolute path [8,9].

**Our Access Method are better than File Access Methods in several ways:-**

**ListFiles:**

In the file management system application the ListFiles are the module which create the excel sheets and read the information or data which is in our computer or device and then write these information or data in the excel sheets.

But the file access method can not create any excel sheets and write them any reading data, which is a disadvantage of the file access method. And our application gives an extra feature of sending a mail option to a specific person and if you want to not send any mail then uncheck the mail option.

**Search:-**

The file management system has a search module that gives the absolute path or location of the file in our computer or system. The file access method can access these methods, sequential access and direct access and indexed access method but these are all methods that can not access any file in the computer system. These methods access files or information in the specific folder or directory.

**Organise:-**

The organise section in our application provides messy files in the folder which have many different files in the folder to organise them in their subfolders in the folder. The organise module is a very important module in our application which provides crucial tasks in the folder.

But the file access method can not organise all different files in their sub folders in the folder and these can have only access methods which are sequential, direct and indexed access method in all methods can not provide any organisation concept of different files to separate in different folders.

## VI. CONCLUSION

In conclusion, the file management system application is an important tool for creating excel sheets or listing out all information or files in one excel sheet.

And this application provides the fast and powerful searching concept to search any file in your computer or device in a few seconds. The application is very simple for understanding the user and it will give another option to send the email for a specific purpose.

They are automatically sent from our computer or our system and it will give the time saving opportunity to take this opportunity to save our time without human intervention. The file management system is a type of application which organises messy folders in your computer or your system.

 The organisation process of our application is to put different types of files(audio, video, pdf, image, docx, etc) in a folder to organise them in different subfolders. Such as images are put in the image subfolder, audio files are put in the audio subfolder, videos are put in the video subfolder and all files are organised in their subfolders in the folder.

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The file management system application is very helpful for today in our daily life for time saving and reducing complexity and this is user friendly and easy to use.

## REFERENCES

[1]. Reza Asgari and Reza Ebrahimi Atani, "SECURE FILE MANAGEMENT SYSTEM FOR JAVA CARDS", International Journal in Foundations of Computer Science & Technology(UFCST), Vol.3, No.5, September 2013.

[2]. Nikhil kumar, Akshay Bansal, Kartik Singhal, Pratham Sharma, Dr.Vinesh kumar, "File-Management-System", International Journal of Computer Science and Information Technology Research, Vol.8, Issue 2, pp: (74-78), Month: April - June 2020.

[3]. George Timson, "THE FILE MANAGER SYSTEM", Veterans Administration Medical District 27, 211 Main Street, San Francisco, CA 94105.

[4]. Anwar M.A., Naseer Ahmed, "An e-Course file management system: A green campus initiative", Information and Knowledge Management, ISSN 2224-5758(Paper) ISSN 2224-896X(Online), Vol.3, No.1, 2013.

[5]. Heidilyn V.Gamido, Marlon V.Gamido, Ariel M.Sison, "Developing a secured image file management system using modified AES", Bulletin of Electrical Engineering and Informatics, Vol.8, No.4, December 2019, pp. 1461~1467, ISSN: 2302-9285, DOI: 10.11591/eei.v8i4.1317.

[6]. Ayman Hussein Odeh, Hussein Ayman Odeh, "An Online Course File Management System (OCFMS)", International Journal of Simulation: Systems, Science & Technology, May 2019, DOI: 10.5013/IJSSST.a.20.02.09, ISSN: 1473-804x online, 1473-8031.

[7]. Richard Watson, Stijn Dekeyser, Nehad Albadri, "Exploring the Design Space of Metadata-Focused File Management System", Proceedings of the Australasian Computer Science Week Multiconference, january 2017, Article: 20, DOI: 10.1145/3014812.3014833.

[8]. Google.com

[9]. Youtube.com

[10]. w3schools.com

[11]. GeeksforGeeks.com

[12]. javatpoint.com