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An Experiment: A File Management System that Simulates ISAM (Indexed Sequential Access Method)

Roy Baksh and Dr. Ronald Frank
Computer Science Department, Pace University
1 Martine Avenue, White Plains, NY 10606, USA
roybaksh@hotmail.com

Abstract

Indexed Sequential Access Method (ISAM) is a management system created by IBM to efficiently retrieve information. There are two modes of operation: random access and sequential access. Random access of information is retrieved with an index that is defined by different records and sequential access retrieves information in the order entered [1]." ISAM is essential in creating filing systems, because of the important functions that it provides: 1) searching, 2) editing, 3) deleting, and 4) inserting records. This system gives insight into the functions and capabilities of a program that transforms a labor intensive operation into an efficient way of storing and retrieving information. It also provides information on the relevance, usefulness, and methodology of ISAM.

Keywords

ISAM, Filing System, Indexed Sequential Access Method, File Management System.

Methodology

For this experiment, Microsoft Access is used as the primary foundation, in which SQL is used. For functionality of the graphical user interface and SQL, Visual Basic for Applications was used.

The Microsoft Access database consists of eight tables. These tables are as follows:

1. ARCHIVED_FILES – Stores all archived file information.
2. ARCHIVED_LOCATIONS – Groups all archived files by drawer number.
3. CATEGORIES – Groups all files by category.
4. FILES – Stores all file information.
5. LOCATIONS – Groups all files by drawer number.
6. PASSWORD – Stores the current database maintenance module password.
7. TEMP – Used to store search results and then perform narrow search. Table TEMP is the same as table TEMP_COPY.
8. TEMP_COPY – Used to store search results and then perform narrow search. Table TEMP is the same as table TEMP_COPY.

There is a 1-to-many relationship between LOCATIONS and FILES and a 1-to-many relationship between CATEGORIES and FILES. As for the archived files, there is a 1-to-many relationship between ARCHIVED_LOCATIONS and ARCHIVED_FILES.

Resources Required

Software supplied by MSDN Academic Alliance [2]:

- Microsoft Access 2003
- Microsoft Project Professional 2003
- Microsoft Visio Professional 2003

Software not supplied:

- Macromedia Dreamweaver 3
- Microsoft Publisher 2003
- Microsoft Word 2003

I broke this project up into 7 different modules (searching for files, searching for archived files, inserting files, rearranging files, rearranging archived files, database maintenance and report generation). These 7 modules are reflected in the main menu as seen in figure 1.

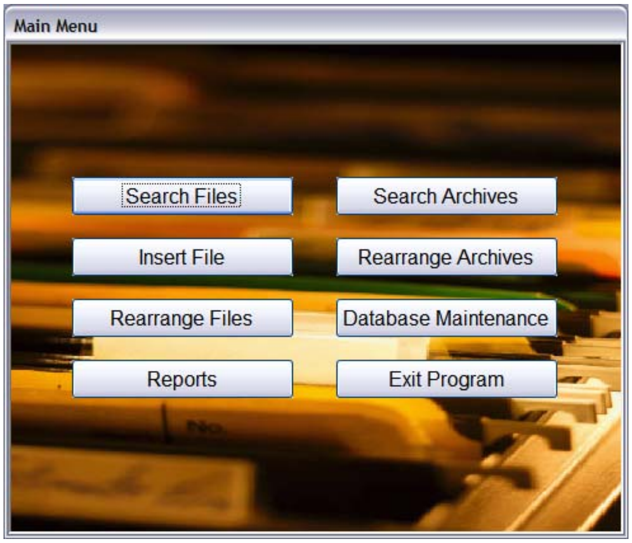
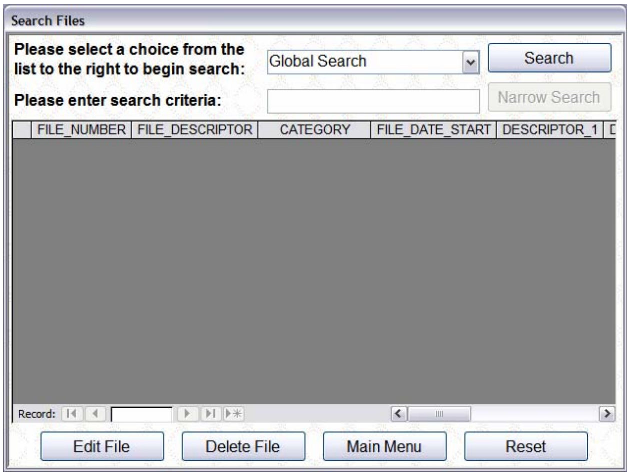


Figure 1 – Main Menu

Users can search for files by file number, file descriptor, category, file date start, descriptor 1 thru 4 and location or perform a global search. Once the results are displayed the user has a choice of editing or deleting the file (not available in searching through archive) as seen in Figure 2. When a file is deleted, the file descriptor is marked open so the file number can be reused for the insertion of a file later.



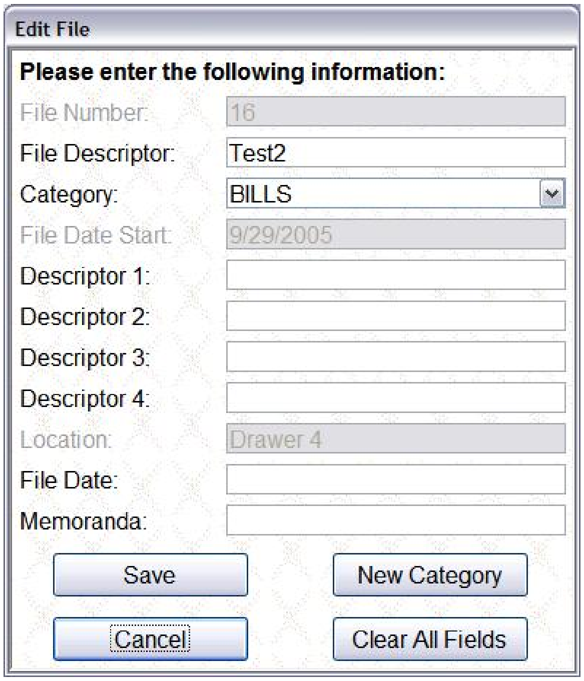
Please select a choice from the list to the right to begin search: Global Search

Please enter search criteria:

Figure 2 – Search Files

Users can also search for archived files the same way regular files are searched for.

If the user selects "Edit File," only certain fields can be changed, file descriptor, category, descriptor 1 thru 4, file date and memoranda. File number, file date start and location cannot be changed as to maintain the integrity of the filing system. Location can be changed only if files are rearranged. A new category can be created if the current category does not fit the users need. This is displayed in Figure 3.



Please enter the following information:

File Number:	16
File Descriptor:	Test2
Category:	BILLS
File Date Start:	9/29/2005
Descriptor 1:	
Descriptor 2:	
Descriptor 3:	
Descriptor 4:	
Location:	Drawer 4
File Date:	
Memoranda:	

Figure 3 – Edit File

Users also have the capability of inserting files as seen in Figure 4. All fields are editable except for file number and location. The file number is automatically generated. If there are any open files then the first open file will be used. If no open files exist, a new file number is created. The corresponding location is generated depending on the file number. New categories can be created as well. New locations can be created only if no open files exist

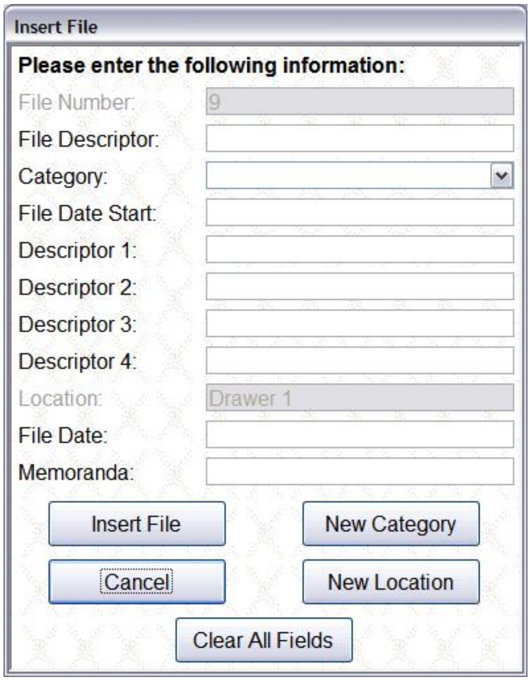


Figure 4 – Insert file

If files or archived files ever need to be rearranged the user can move files or archived files into the previous or next drawer as seen in Figure 5 and 6.

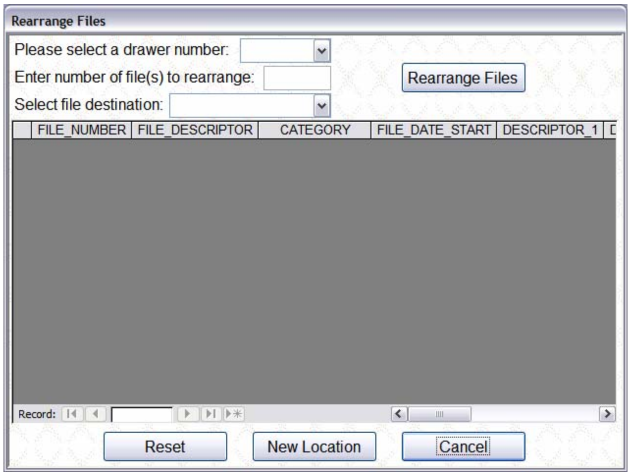


Figure 5 – Rearrange Files

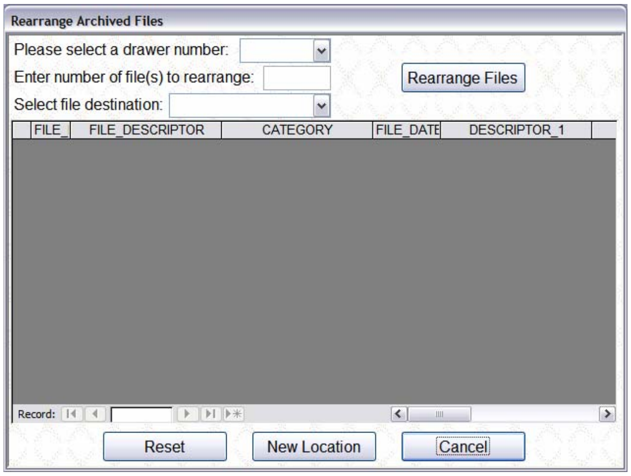


Figure 6 – Rearrange Archived Files

Reports can be generated which can be used for cross-referencing as seen in Figure 7.

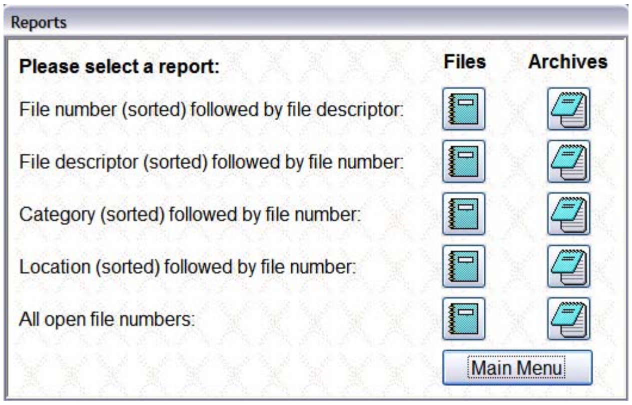

Reports
Please select a report:
Files
Archives
File number (sorted) followed by file descriptor:
File descriptor (sorted) followed by file number:
Category (sorted) followed by file number:
Location (sorted) followed by file number:
All open file numbers:
Main Menu

Figure 7 – Reports

There are five types of reports, two of which are used heavily:

1. file numbers (sorted) followed by each main file descriptor including “OPEN”
2. main file descriptors (sorted) followed by each file number
3. the category (sorted) followed by all the file numbers in that category
4. drawer number followed by range of the file numbers it contains
5. [optional] a list of all “OPEN” (deleted) file numbers less than the last file number in use followed by their current drawer number.

To limit the size of the database, administrators will have access to database maintenance (see Figure 8) which is password protected (see Figure 9). The current password is “cs616” and can be changed in the future by an administrator.

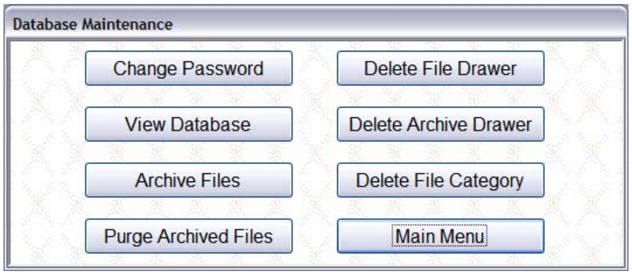
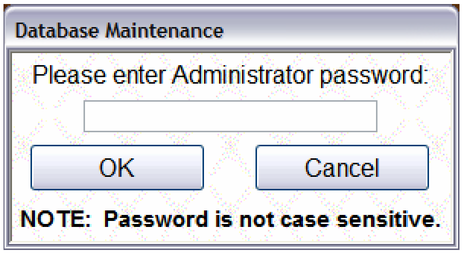


Figure 8 – Database Maintenance



Please enter Administrator password:

NOTE: Password is not case sensitive.

Figure 9 – Database Maintenance Password

When files are no longer needed, an administrator can archive the files. These files can also be purged at a later date if necessary. File drawers can also be deleted along with categories that are not in use by any file. As well, categories can be deleted if no file is associated with that category. File and archive drawers can only be deleted if no files exist in that drawer.

Discussion and Conclusions

I encountered several difficulties while creating this project. The first problem was just trying to simply get a good understanding of what the main purpose of project is and what my job is as creator of this program. To get a better understanding of what I am suppose to do, I kept in contact with the client who helped to give me a better and clearer understanding of all the project details. Another problem that I encountered was figuring out the connection between the table structure and the relationships. Luckily, I was able to figure out the connection, which led me to create separate tables for all those fields in common.

Future Work

As for the recommendations for improvement of this project for future program creators, I suggest that the project remain as is. There are many key components to this project, which have certainly helped me to better understand my purpose. I found each part of this project to be detailed, and helpful in designing my filing system.

I recommend that students who get involved in this project in the future should be exposed to importing data, as this will be a key feature if this program was to be marketed in the business world. For example, a text file will require the following fields in each line separated by some delimiter, which in this case is a comma (,): FILE _NUMBER, FILE_DESCRIPTOR, CATEGORY, and so on. This only makes this program market itself to companies, big or small who already have some sort of program for filing on their network. Why, because all that would need to be done is to import all the data on the companies network into the program. This eliminates the headache of having to manually go in and input the information into the system. This alone is a deterrent to companies with a limited work force. Another option that could be used with this program is scanning, which requires ISIS or TWAIN drivers in order for scanning to occur. This gives organizations the chance to save images as attachments for each file, and to be able to browse through files on the hard drive. Also, adding a task scheduler to back up the entire database and store data to some remote location can free one from the headache of having to worry about computer crashes or hackers. Finally, if this program ever becomes too overcrowded with files, the program can be converted from a Microsoft Access Database (MBD) to a Microsoft Access Project (ADP). Using an SQL server is much more efficient and faster than having a personal computer perform the searching, edits and/or deletions of file.

References

[1]http://search390.techtarget.com/sDefinition/0,,sid10_gci214626,00.html

[2] http://msdn01.e-academy.com/elms/Storefront/Home.aspx?campus=pace_csis