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# DEVELOPMENT OF A FILE TRACKING SYSTEM FOR TERTIARY INSTITUTIONS

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## Abstract

Large volumes of data are usually generated in most institutions of learning today. Locating files among tons of others can thus be tedious and time-consuming process for administrative as well as academic staff of such institutions. The aim of this paper is to develop and deploy an Electronic File Tracking System (EFTS) to improve productivity amongst Core administrative personnel.

The EFTS developed in this paper is a web application that is able to manage the creation, and movement of files from desk to desk of personnel who work on them. The system was developed with open source software after establishing vital functional and non-functional requirements and detailed workflows. Files, such as, reports, decisions, requests, reminders can be processed and tracked by the system in real-time. Furthermore, the system helps in online tracking and provides location information. The system is interactive and usable and able to improve file management and productivity in University administrative operations.

Keywords: File tracking, open source software and workflows.

## 1 INTRODUCTION

The need to keep track of files has become significantly important today particularly in institutions of higher learning. However, little is being discussed about this in literature. In most cases, files are transferred physically from one desk to another within a department or between departments. File Tracking System offers clear visibility of the file movement throughout the file processing channel [1]. Sometimes there is need for a file to go through several personnel before it can be rendered acceptable. There are however drawbacks in transferring these files from one desk to another such as getting these files missing or forgetting to document the transfer. There is thus need for a system that can provide solutions that will address such problems while saving time and energy of administrative workers. File tracking systems offer a viable solution in this regard. Notable examples of such a system are described in the paragraphs that follow.

A file tracking and document tracking software was launched by [2] in 2013. The software is a user-friendly barcode-based tracking system. Information and Data Exchange Advanced System (IDEAS) is a file tracking system developed using Free and Open Source Software (FOSS) by the National Informatics Centre (NIC) in Kerala, India [3]. It is developed as a web application and its purpose is to keep track of files coming into a government office (that is, citizens' petitions). Due to its intuitive web interface, government officers are able to easily record or query information about the petitions or files received within their respective offices through the medium of the Internet. Also, users which include both citizens and officers alike can track the movement of files making the system a transparent one. The drawback of this particular system is that it is built to serve files in government offices and not necessarily Universities or other institutions of higher learning.

Another similar system is one developed by a division of NIC; India called the "Department of Personnel and Training". The system was developed as a web application for the government of New Delhi. It is used to create, send and track government files (receipts). Similar to IDEAS, the system allows users to track the movement of important files in the process of decision-making. The drawbacks of this system include: security - in any possible hacking situation, all the files can be easily manipulated; also no activity log is implemented for tracking files; the system is platform dependent – runs on a Windows-based server (IIS) and requires proprietary databases as backend. The implementation language is Active Server Pages (ASP).

Centralized File Movement and Tracking Information System (CeFMaTIS) is yet another file tracking system based on Web as well as Client Server Architecture and developed for tracking the movement of files and papers in medium as well as large government offices [4]. The goal of the system is to replace the manual record keeping system for files/letters with a more efficient paperless automated

system. The system is platform independent, fully menu driven and user friendly; the data entry is done once only and it ensures extensive built in data validation checks; it has extremely powerful search capabilities; it ensures acknowledgment to the sender about physical receipt of file; it notifies a receiver about incoming files; it also provides a facility to recall the file if wrongly marked. It is highly secure providing: centralized database, super user administrative control, better availability, reliability, and multi layered security. Aside the aforementioned systems, some file tracking systems employ Radio Frequency Identifier (RFID) technology. RFID technology allows you to track files like you would using bar-coding [5].

In addition, Infotronic Systems for instance has developed a file tracking system that employs RFID technologies. The rationale behind the development of the application is for ensuring that existing files are secure. Each file, in file storage (room) receives a RFID file tag label, depending on the file type. The tag contains the name and other related information, including a unique file number. In the file storage door an RFID security gate (sensor) is implemented so that whenever someone takes a file from the file room and tries to go out without proper clearance, an alarm is triggered and such a person is accosted by security guards on duty. The system is very powerful especially for securing files but the same cannot be said for it being used for arranging or searching files. This RFID-based tracking system can also be expensive to implement particularly by a tertiary institution. The costs include those of buying sensors, label tags, and other essential accessories. This can be a drawback in some respect.

Putting it all in perspective, we identify that several tracking systems exist that are being used outside the context of learning institutions like Universities. Such systems despite their merits also have drawbacks that make them unsuited for tertiary institutions. A file tracking system that takes the identified drawbacks into consideration, while also targeting tertiary institutions, is desirable. Companies need to control and manage the life cycle of electronic documents. And one of the answers is to track and trace electronic documents [6].

Locating files is one of the greatest problems in universities nowadays. Time is wasted archiving or searching files, energy is wasted chasing misplaced files, deadlines are missed and sometimes files are lost. Seeing these problems, an application was developed to make a system for file tracking that will solve all of these problems in the best proper way [7]. The aim of this paper therefore is to design and develop a file tracking system for tertiary institutions. The rest of this paper is organised as follows: Section 2 describes the methodology employed in realising the system. Section 3 depicts the outcome of the development and necessary discussions while Section 4 concludes the paper.

## **2 METHODOLOGY**

To realise the aim of this paper, we begin by modelling the proposed tracking system using the Unified Modelling Language (UML). UML is a diagrammatic object-oriented modelling language. It uses diagrams to document an object-based decomposition of systems and to show the interaction between these objects and the dynamics of these objects. The file tracking system was developed as a web application with three-tier architecture. Hypertext Mark-up Language 5 (HTML5) was used to create the user interfaces for the application. Hypertext Pre-processor (PHP) was used handle data transfer from the user interface to the database and also query requests to the database from the user interface. The reasons for choosing PHP is that: it is a widely-used, open source scripting language; also, PHP is free software and runs on multiple platforms making it platform independent; PHP is compatible with almost all Web servers in use today (Apache, IIS, etc.); PHP supports a wide range of databases; It is easy to learn and runs efficiently on the server side; PHP can generate dynamic page content. It can create, open, read, write, delete, and close files on the server; It can collect form data and can send and receive cookies. PHP can add, delete, modify data in a database and can restrict users from accessing some pages on your website. PHP can encrypt data. With PHP diverse output formats can be generated e.g. HTML, images files, PDF files, flash movies, XHTML and XML.

The database management system used is MySQL. It is the world's most popular open source database, enabling the cost-effective delivery of reliable, high-performance and scalable Web-based and embedded database applications. It is ideal for both small and large applications. MySQL is very fast, reliable, and easy to use. It supports standard SQL. MySQL compiles on a number of platforms. It is free to download and use and is developed, distributed, and supported by Oracle Corporation.

Cascading Style sheets (CSS) came in handy for styling the user interfaces thereby making them aesthetically pleasing to the would-be users of the system.

## 3 RESULTS

### 3.1 UML Diagrams

#### 3.1.1 Use Case Diagram

Use case diagrams show a system from an outsider (e.g. user) perspective. The system is treated as a black box and one solely identifies what the system is used for. The use case diagram for the tracking system is depicted in Fig. 1.

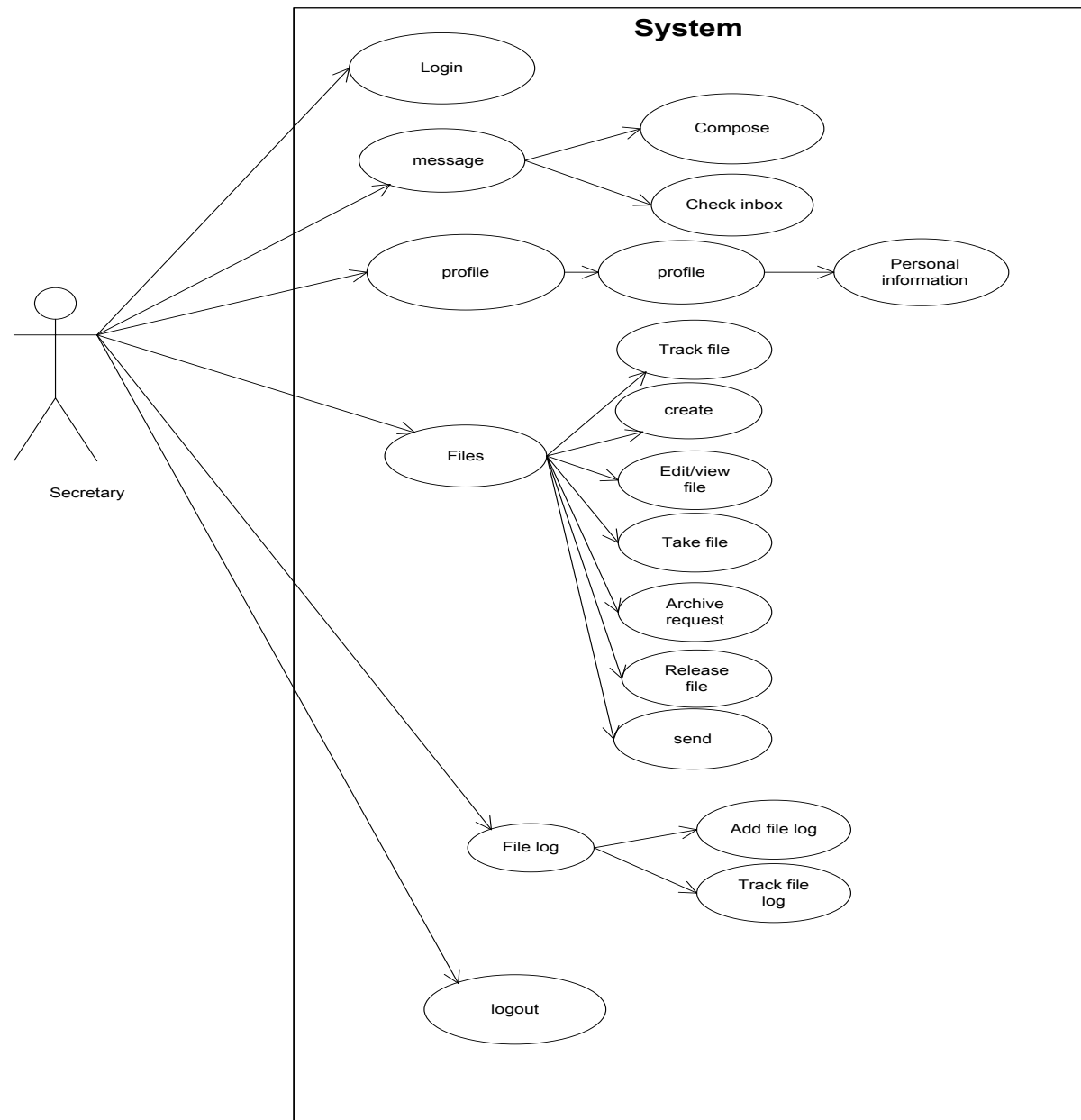


Fig. 1: Use case diagram of the file tracking system showing the key functionalities of the system.

#### 3.1.2 Sequence Diagrams

Sequence diagrams are a kind of interaction diagram that show the sequence of messages exchanged in the context of a specific scenario. The sequence is in time order and is very intuitive and ideal for discussing requirements with clients or to acquire an initial understanding of the system being modelled. The sequence diagram that shows the process of file archiving in the tracking system is depicted in Fig. 2.

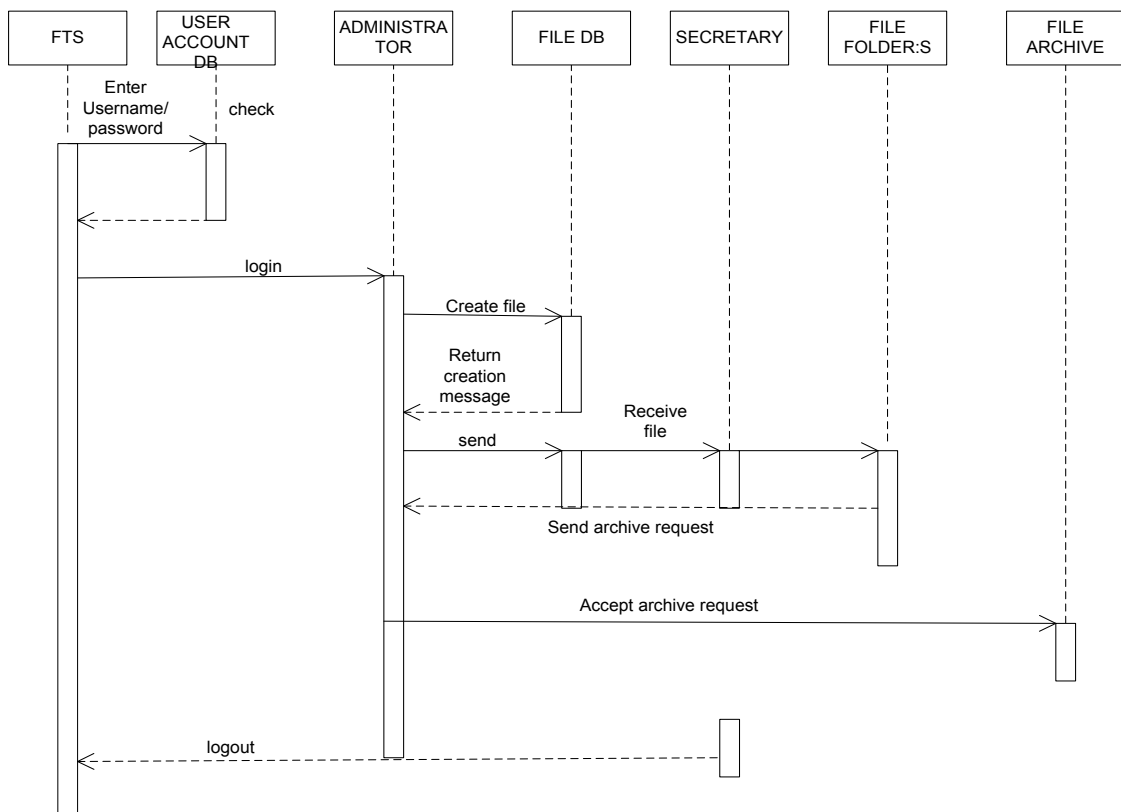


Fig. 2: Sequence diagram showing the process of file archiving in the tracking system.

## 3.2 Application user interfaces

### 3.2.1 Login Page

This is an interface that gives the user access to the system. When the application loads, it will prompt the login interface which requires the user to enter the username and password and then click the login button. The login page for users is shown in Fig. 3.

Fig. 3: Login interface of the File Tracking System.

### 3.2.2 Create file interface

The system displays this page when a user clicks on “Create File” after having logged in. To complete the form, the name of the file; the file number; the department where the file is created must be filled in. The screen is as shown in Fig. 4. When a file is created, it automatically moves to the Virtual shelf for other users to take. Actions such as “take file” can be seen here. A screen display of the Virtual shelf and function is shown in Fig. 5.

**FILE TRACKER**

Welcome, ella

**CREATE FILE**

File Name:

File Number:

Department:

Fig. 4: User interface for create file module.

**FILE TRACKER**

Welcome, busayo

**VIRTUAL SHELF**

Computer Engineering

Search

| TITLE OF FILE               | CREATED BY  | ACTION               |
|-----------------------------|-------------|----------------------|
| lmdkfmldmldk dldkldkfm ldkf | FRANK OFODI | <a href="#">Take</a> |
| temi                        | ella        | <a href="#">Take</a> |

Fig. 5: User interface showing the Virtual Shelf.

When a file is taken by any user, it drops into their “My Files” closet. An administrator or departmental user is able to take and release files from and to the virtual shelf respectively. The function of releasing files is done from the “My Files” page as shown in Fig. 6. The “My files” page for various privileges differ. For instance, the administrator “my Files” page has the following function

**FILE TRACKER**

Welcome, ella

**MY FILES**

| TITLE OF FILE | FILE NUMBER | DATE       | ACTION   |
|---------------|-------------|------------|--|
| temi          | 111         | 28-03-2014 | <a href="#">RELEASE</a> <a href="#">VIEW / EDIT</a> <a href="#">ARCHIVE</a> <a href="#">SEND</a> |

Release View/Edit Archive file Send file

Fig. 6: User interface showing functions available to an administrative user.

### 3.2.3 Messaging Interface

This function is intended to be used for communication among users. It is built to function as just the Email. The interface of this page is shown in Fig. 7.

**FILE TRACKER**

Welcome, ella

**Message**

[Inbox\(0\)](#)  
[Compose](#)

To:

Subject:

Body:

Fig. 7: Messaging interface.

### 3.2.4 Log file

File log is used to keep records of hardcopy files that have been sent to another user to enable tracking. A secretary for instance who wants to document a transfer of hardcopy files, can use this module to record the transfer. The interface is in Fig. 8.

**FILE TRACKER**

Welcome, thelma

**LOG FILE**

File Name:

File Number:

Department:

Reciever:

Fig. 8: File log interface.

### 3.2.5 File Tracking

This module helps to determine the location of a file irrespective of its geographical location. The system displays the page to track files. The user can either track a file using the file number or track a file using the date the file was created as shown in Fig. 9. Fig. 10 shows the outcome of a sample file being tracked.

Fig. 9: File tracking interface.

| FILE TRACKING |                             |
|---------------|-----------------------------|
| File Name     | Indkfmikdmlik dklfdkfm ldkf |
| File Number   | 43                          |
| Date Sent     | 28-03-2014                  |
| Previous User | Nil                         |
| Current User  | busayo                      |
| User ID       | EMES                        |

Fig. 10: Result of a query sample of file track.

### 3.3 Evaluating the application

A comparison between the proposed system and existing ones is given in Table 1. The (\*) symbol denotes that an application satisfies the feature against which it is evaluated. Spaces signifies that an application does not possess the particular feature against which it is evaluated.

Table 1: Tracking Systems Comparison.

| Systems<br>Characteristics                | Proposed<br>System | IDEAS | NIC<br>software | CeFMatIS | RFID-based<br>tracking system |
|---|--------------------|-------|-----------------|----------|-------------------------------|
| Messaging                                 | *                  |       |                 |          |                               |
| Tracks both digital and<br>hardcopy files | *                  |       |                 | *        |                               |
| Activity log present                      | *                  |       |                 | *        |                               |
| Platform Independence                     | *                  | *     |                 | *        | *                             |
| Inexpensive to implement                  | *                  | *     | *               | *        |                               |

## 4 CONCLUSION

This paper has discussed the design and implementation of a web-based file tracking system. The system is designed primarily to track files that are born digital thereby reducing the use of paper,



especially in universities, to the barest minimum possible. Such a system to the best of our knowledge has not been created for tertiary institutions. To improve on the work however, a pilot study as well as a usability study will be conducted in future work. The feedback from these exercises will be used to improve on the overall features of the system. Also, a cross-platform mobile version of the application will be developed.

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