FILE TRACKING SYSTEM

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By

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Dedication

I dedicate this thesis to my beloved university friends and professors.

Abstract

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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, I decided to make a system for file tracking that will solve all of these problems in the best proper way.

File Tracking System is a web application that manages all the files movement from one desk/room to another one and helps them in managing the flow of files effectively and efficiently. All the files such as: reports, decisions, requests, reminders, and others can be processed and tracked by the system at any time.

The system helps in online tracking or location information and pendency monitoring more effectively by providing a plethora of information at a glance. It has extensive facilities for managing classification of all files. The system follows a procedure of file unique numbering and enables file management, file status monitoring, file movement tracking, etc. It also has a very powerful search form to locate a file and analyse the history of movement of that file.

Abstrakt

Fakulteti i Arkitekturës dhe Inxhinierisë

Udhëheqës: Igli Hakrama

Vendndodhja e dosjeve është një ndër problemet më të mëdha që hasim në ditët e sotme. Humbim kohë duke kërkuar dhe arkivuar, humbim energji në përpjekje për të rregulluar dosjet e parregullta, humasim afatet dhe ndonjëherë edhe vetë dosjet. Duke I parë gjithë këto probleme, vendosa të krijojë një sistem mbi përgjimin e dosjeve që do I zgjidhte këto problem në mënyrën më të mirë të mundshme.

Sistemi i përgjimit të dosjeve është nje web aplikacion që menaxho të gjitha lëvizjet e dosjeve nga një dhomë në tjetrën dhe ndjek rrjedhën e tyre në mënyrë efikase. Të gjitha dosjet e tilla si: raportet, vendimet, kërkesat, përkujtimet, etj mund të përpunohen dhe përgjohen nga ky sistem në cdo kohë.

Sistemi ndihmonë në përgjimin online, vendodhjen e dosjes dhe monitorimin e kohëzgjatjes ne mënyrë efikase duke siguruar informata të hollësishme në një kohë të shkurtë. Poashtu ofron një lehtësi në menaxhimin dhe klasifikimin e të gjitha dosjeve. Sistemi ndjekë një procedure të indeximit unik të dosjeve duke lehtësuar menaxhimin, statusin dhe përgjimin(lëvizjen) e tyre. Poashtu ka një sistem të fuqishëm të kërkimit të dosjeve dhe analizimin e lëvizjes së tyre.

Table of Contents

List of Figures

List of Abbreviations

MVC	:Model View Controller
FTS	:File Tracking System
IDEAS	:Information and Data Exchange Advanced System
RFID	:Radio Frequency Identification Device
WEB	:World Electronic Broadcast
IT	:Information Technology
LAMP	:Linux, Apache, MySQL, PHP/Python/Perl
ASP	:Active Server Page
PHP	:HypertextPre-processor
SQL	:Structured Query Language
MS-SQL	:Microsoft Structured Query Language
HTML	:HyperTextMarkup Language
XHTML	:ExtensibleHyperTextMarkup Language
XML	:ExtensibleMarkup Language
CSS	:Cascading Style Sheet

PDF	:Portable Document Format
GNU	:General Public License
OS	:Operating System
ODBC	:Open Database Connectivity
ISO	:International Organization for Standardization
AM	:Administrator Module
DM	:Department Module
SM	:Secretary Module

Chapter 1

Introduction

“When it comes to an effective and smooth running office environment, there are certain elements that must be implemented, despite the industry you are in. First and foremost, your files are the key to your operation and learning how to properly maintain a sufficient paper trail can make a world of difference when it comes to your daily operations.”[1]

Nowadays Universities use a physical standard way for making decisions, requests or any reports. Other than this when the archiving of files is needed, they archive them in physical standard way. In most of the cases the archiving have to be done in alphabetical or numbering order. This causes an energy and time wasting, misplacing of files, sometimes even loss of them.

Imagine if a university wants to make a decision or a report, how much time and energy is wasted. A university Rector has to make the report print it in many copies for sending it to the academic board and other persons responsible for decision making situations for their suggestions, and if accepted, email to all departments and administrative board to inform them for a new decision made. As you can see not only time and energy is wasted, but it has also a paper cost for printing copies of that file.

Another situation is archiving files. Suppose that a university made a decision in a specific topic and after the decision is made they want to archive that decision file in archiving room. Other than going to the archive room, they have also to find the proper place for archiving . In the other way, after a while, if they want to put a hand

on the file that is archived they will consume time to go to the archive room and find the proper file. All of these actions will consume too much time and waste energy.

The seldom situation is file lost. To secure a file room it costs too much. All those sensors, anti-theft alarms, fire alarms, and others have their own cost. Furthermore a corruption of file can happen. When I say a corruption, I mean not authorized person can make a modification to a file, tear it or burn it. As you can see, all of these situations can cause serious problems. Seeing these problems, I decided to make a system for file tracking that will solve all of these problems in the best proper way.

What is FTS?

File Tracking System is a web application that manages all the files movement at any time from one desk/room to another one and help in managing the flow of files efficiently. Any desk/room can receive and send request and decisions at any time. The system follows a procedure of file unique numbering and enables file management, file status monitoring, file movement tracking, etc. It also has a very powerful search form to locate a file and analyse the history of movement of that file. Other than this, the system will allow the administrator (Rector of a university) to create faculties of that university and assign to them all the departments, depending on the hierarchy of that university. Each department must have a user (chief of department) who will be responsible for that department. In the other hand, the administrator will also have the ability to add a user (Administrative Staff) whose will play the role of the Secretariat of university. All of them will have the ability to create a custom file (ex: request or decision) and send them to the ones responsible for confirmation. When the file is sent to the responsible person, they will have a section of new arrived files and an action to accept or reject the file. If a

file is rejected, it will require writing a reason of rejection and it will automatically return back the one who sent it. If the file is accepted it will move to the accepted files section and will have a “forward”, “send for archiving”, ”print”, “download” and “edit” actions. When the “forward” button is pressed it will open a window where you will have your possible forwarding’s. If the file is finished, the send for archiving button should be pressed and the file will go to the administrator for archiving. Other than these the file is available for download and print. Notice also that file can be edited only if it was accepted. Only administrator will have the ability to see the movement history of a file archive a file in the database (Archive Room).

Benefits of FTS

- Solution for effective and efficient management of files
- Easy File Tracking
- Online fast and secure file management
- Staff improvement
- Organizational efficiency improvement
- Paper cost reduce
- Less energy used
- Time spent reduce
- Eliminates duplication of files
- Reduces possibility of mistakes

Chapter 2

Literature Review

It is obvious that nowadays web applications have an extraordinary rising worldwide. Even desktop applications and mobile applications has evolved in different directions. On personal computers, the most popular application for accessing any content and any applications on the web, is the web browser. In mobile devices, the majority of web content is consumed via custom built native web apps.[2] The world wide web has evolved from a document sharing systems to a massively popular general purpose applications or in the other words the most powerful information distribution environment in the history of humankind.[3]

In comparing web application with desktop application you can see a lot of differences. Desktop applications have many drawbacks. They have to be downloaded and installed before their use, have to be developed for multiple platforms, cannot be accessed online, maintenance or administration its harder, requires more work and have more cost[4] other than the web applications which requires less development, no need to be installed or manually upgraded, supported in multiple platforms, are cost effective and can be deployed and accessed instantly worldwide with no middlemen or distributors[5]. Even when we speak about security issues, a web application is the one who stays in top. When both of the applications, web and desktop, are in a computer with access to the internet, the danger for both its kind of same. However, when the desktop applications are in self-storage, they are much more exposed than the web applications in data storages[6].

2.1 IDEAS

Information and Data Exchange Advanced System is an advanced file information system developed by the National Informatics Centre in Kerala, India. It is built on Free and Open Source Software.[7] It is a web based application for file tracking system which records details of the files that come into a government office (ex: petitions which are received from citizens). Officers can use the web interface to record or query information of the petitions or files within their offices using Internet or the government's own State Wide Area Network. Citizens and officers alike can obtain online information about the movement of files. It is currently used in the many offices of Ministers and Administrative Departments in the Kerala Government Secretariat. This system has also been implemented in the Office of the Transport Commissioner, Office of the Director of Technical Education, Legislative Assembly and the Kerala State Planning Board.[8]

As it is understood, the system is very powerful in managing petitions and it is widely implemented in India's Government Offices. It contains only a powerful search engine which helps finding and tracking petitions or other files you sent to a specific office of government. While in the other hand it has a management system that lets responsible persons manage those files.

Comparing with File Tracking System, this is one of the projects that have some similar functions with it, or better to say it's a project that tracks files as this FTS does. However this is completely organized in a way to serve the government offices whereas FTS is organized to serve all paper-related offices, especially universities. This means that IDEAS is organized to work between citizens and government (outside-inside), whereas FTS is organized to work between the offices staff (inside-

inside). In the IDEAS system, users will have the possibility only to search/track for any file that has been sent before in a standard way (sent as an a4 paper), whereas in FTS everything is done online, no need of any paper. Simply IDEAS system has been built to works such as e-posts tracking, you sent a request to specific office of government and you track the movement of your file.

2.2 File Tracking System in New Delhi, India

Another system, which was implemented in New Delhi's Government and which was done by the Department of Personnel and Training of the same National Informatics Center in India, had some similar functions with FTS. It is a web application used inside government to create, send and track their files (receipts). It enables the users to maintain a consistent watch over the movement of various important files in the process of decision-making. It contains a single module for all the staff. The administrator (person responsible for receipts) was the one who created the file (receipt) and forwarded to dealing person to deal with it. The dealing person entered the module and went to the forwarded files section to see the file for further instruction. If the file was ok at all, the dealer was the one who closed the file (cannot be forwarded anymore). This web application was developed for a Forest Department of Pradhya, India.[9]

Comparing with File Tracking System it has a lot of disadvantages. One of them is the security issue. In any possible hacking situation, all the files could have been manipulated because of only one module. Also having only a module can make managing harder. A solution to those issues is the creation of multiple modules, independent from each other. Furthermore it is a simple web application that deals

only with tracking of file. No other functions are implemented, whereas FTS system has an activity log also implemented in tracking of files.

Another disadvantage of this project comparing to FTS is the programming language they used to make the application. They used ASP, which has a lot of limitation such as:

- It is only windows-based which means that works only with windows platforms
- You need to buy MS-SQL for database connection or other tools (ex: IIS) if needed
- Codes of ASP work slower

Whereas the programming language used to build FTS , which in this case is PHP, distinctly has advantages on ASP, such as:

- Works on multiple platforms (such as: Windows, Unix and Linux, Solaris, etc)
- It works on multiple databases. Common one used by PHP is MYSQL which does not cost you anything.
- Codes work faster

2.3 RFID File Tracking Systems

There are several software about File Tracking System using RFID Technology. However the one chosen to be explained is RFID FTS done by Infotronic System.

Infotronic Systems is a company that has done a File Tracking System using RFID technologies. Their main idea was for making existing files more secure. Each file,

in file storage (room) receives a RFID file tag label, depending on the file type. The tag contained the name and other related information, including a unique file number. In the file storage door it is implemented an RFID security gate (sensor). So whenever someone takes a file from the file room and goes out with that file, an alert/alarm is generated and security guards interfere immediately. [10]

As it is understood, the system is very powerful for securing files but It cannot be said the same thing for arranging or searching files. This RFID system also has some costs of buying sensors, label tags, etc. Hence comparing with FTS, which has no cost at all, it kind of stays behind. One of the main reasons is that if a search of a file is required. Finding is easier with FTS because all the files are archived in a database and can be accessed online in any time while with physical search in file room is required and it cannot be accessed at anytime. About the security, RFID system has physical security guards while FTS have a virtual security guard which is powerful authentication check where no one who is not authenticated can enter the files archive deposit.

As a conclusion both of these platforms play a similar role in archiving files however they differ from each other a lot, because one has to deal with physical interference while the other one has to deal with virtual interference.

Chapter 3

Software Analysis and Design

3.1 System Analysis

This File Tracking System will be developed to be implemented in paper-based work offices, especially universities, colleges and any educational institutions who deal with a huge amount of files. Everything will be programmed in such a way that will make the usability as easy as possible. It is going to be a web platform which will be reliable, secure and easy to be used. Any report, request, decision or anything that deals with papers now will be solved easily and without any cost. Since offices nowadays spend too much time in organizing (archiving, finding) their files in a systematic way, without forgetting also the cost of papers, this web application will solve all of these problems by saving time and money. No need to go to the archive room and lose your day looking for a file, instead use the search form of this web app and finish the job in seconds.

Take also in consideration if a file is not filled in a proper way. What will you do? Lose your time by judging all the staff responsible for files and create a new proper file? Unfortunately till today universities use this way. But fortunately now we have this web application that will solve all of these problems. This means that every file will have its own history (log). When I say history, I mean this web app will hold (save) the exact time, date and the name of the person who created, forwarded or even putted a hand to the file.

In this web application the latest web technologies will be used. Two main programming languages that will be used to program (develop) this web application will be PHP and MYSQL. HTML and CSS will be the ones that will give a design structure of this web application while Javascript and Jquery will help those in making some powerful animated functions.

3.2 Functional Requirements

File Tracking System is going to have four modules with different privileges: Super-Administrator module, Administrator module (AM) department's module (DM) and secretary's module (SM).

Super-Administrator Module: It is the major module which has all the privileges available. The difference from the Administrator Module, is that when files are deleted from the archive, they can still be restored only form the Super-Administrator.

Administrator Module: The faculties will be created from the Administrator Module together with departments which will be assigned to their required faculty. Meanwhile the administrator will also have the opportunity to assign users (chiefs of departments) to the departments and the ability to manage all the users will be given only to the Administrator. The administrator module will also have an archiving section where he is obligated to archive all the checked-out (finished) files. All the files will be archived from administrator. No file can be archived without permission of him. These are the main roles/privileges of the Administrator. However he has also all other additional privileges such as: managing files, modifying users, seeing reports/statistics, sending messages, blocking all incomings, backing up the database, etc.

Department module: DM will have an interface where it will see the files forwarded to him by the administrator or other users. Other than the files main information, it will have two options: Accept and Reject.

In case of rejection it will be prompted with a message that requires writing a reason of rejection. When a reason is written and a reject button is clicked the file will return back to the one who sent it for correction or any other reason. Notice that in case of rejection the file cannot be modified.

In case of acceptation, the file automatically moves to another section where it becomes available to be edited or forwarded to someone else. In this section the user will have an opportunity to open the file, edit and forward it to SM, with a remark merged to it, for further correction or if no need to forward it has also a chance to return to the administrator for archiving. Other than these it will have also a privilege for printing the file. Meanwhile, every user will have the privilege to change all of their personal information (user profile).

Secretary Module: SM will be a module of users with fewer privileges. It will have almost same functions as DM. The only difference is that they cannot create a file; instead they can send a message in a form of request to the administrator for creating a specific file and forward to them.

They will have to give the last hand of any file that a Department administrator sent to them and forward it (check out) to the Administrator of the system for archiving in the file room (file archive database). Meanwhile they will also have an opportunity to modify their profile information.

Other than the actions/functions explained in modules there will be also a lot of other features (ex: printing, converting to PDF, etc) that will make this system as powerful as possible.

Here are some of the main features of this file tracking system:

- Location
    - The system tracks the file if it's in working mode, or has been archived to storage
    - When in working mode to which user is assigned and to whom it is currently
    - In any possible deadline the user to whom the required file is currently can be warned
- Transfer
    - Files can be sent or forwarded between all users
    - Files can be emailed between all users
    - Files can be emailed outside to a specific email
    - Messages can be send between users of the system
- Administration
    - Manage files
    - Manage Departments and Users
    - General configurations
- Report
    - File track/log report
    - Pending file report
    - Rejected file report
- Backup

  - Database backup
- Restore
  - Database restore
- Search capabilities
  - Filtered search

3.2.1 Functions

Here are the main functions of this web application:

Log in:	Log the user into the system
Log out:	Log the user out of the system
Accept File:	Accept incoming files
Reject File:	Reject incoming files
Create File:	Create a specific decision/report file
Edit File:	Edit created or income files
Archive File:	Archive a file to archive room
Print File:	Print a specific file
Forward File:	Forward a specific file
Convert File:	Convert a specific file to PDF
Add Faculty:	Create a faculty
Add Department:	Create a department

Assign Department:	Assign a department to a specific faculty
Edit Faculty:	Modify a faculty
Delete Faculty:	Delete a wrongly created faculty
Edit Department:	Modify a department of a faculty
Delete Department:	Get rid of an inappropriate department
Add User:	Create a new user
Edit User:	Modify a user
Delete User:	Delete an unwanted user
Warn User:	In case of deadline, warn user holding that file
Edit Profile:	Modify your personal information
User Privileges:	Give a specific privilege to a new created user
Search:	Search for a specific file
Send Message:	Send a message to a user
Compose Message:	Write a message to send to specific user
Delete Message:	Delete an unwanted message
Block Emails:	Block incoming emails
Backup:	Backup database for security issue
Restore:	Restore database

3.3 Software Requirements

3.3.1 Codeigniter

Codeigniter is an Open Source PHP Framework that helps the development of web applications. It aims to make the development of web applications easier and faster by providing different libraries and helpers. So the user don't have to write all the code from scratch.

It is based on Model-View-Controller architecture where View (which is needed for generating interface) and Controller(needed to hold all the functions required) are necessary while the Model (which usually holds the queries for displaying data from database) is depended on the users aim of development.

Because of the structure it uses, it is very useful for complex web applications.

3.3.2 PHP

PHP is an open source scripting language which can be integrated into HTML. Its syntax is mostly borrowed from Java, C and Perl programming lanuages. The aim of this language is to allow web developers to develop dynamic pages quickly.

PHP can be used on all major operating systems such as: Linux, Microsoft Windows, Mac OS, etc. It also supports most of the nowadays used web servers. This includes Apache, IIS and many others. From this you can understand that using PHP means freedom of choosing an operating system together with a web server. Furthermore, you also have the choice of using object oriented programming or procedural programming or maybe both of them.

With PHP you can not only output HTML but also images, texts, PDF files, Flash movies, etc. Other than this, it can save them in the file system.

One of the strongest features in PHP is the support of a different databases. Creating database driven web pages is very easy using PHP. [11]

3.3.3 MySQL

MySQL is the most popular open source database software. It is the most downloaded and distributed software. Because of speed, ease of use and reliability, it has become the best choice for Web, Web 2.0 and all IT Companies. I am saying this because most of the largest and famous companies such as Yahoo, Google, Nokia YouTube, Wikipedia and others use MySQL. They do this because other than saving time, it saves also money.

MySQL was originally founded and developed in Sweden by two Swedes and a Finn: David Axmark, Allan Larsson and Michael Monty Widenius, who had worked together since the 1980's.[12]

3.3.4 Javascript

JavaScript is an object scripting language which nowadays it is used in a lot of web pages, tablets, smart phones and server applications worldwide. It’s basic syntax is similar to Java and C++. Language constructs such as: if statements, while and for loops, switch and try catch blocks functions nearly same as in these two languages. JavaScript can function as a procedural and an object oriented language. [13]

3.3.5 HTML

“The documents on the Web are written in the HyperText Markup Language. HTML documents contain content to be displayed, formatting instructions that tell the browser how to display the contents of the document, and links to other documents. HTML has evolved along with browsers to achieve better visual presentations and standardization.”[14] Web browsers read the HTML files and show or compose them into web pages. Tags are not displayed; however they are just used to interpret the content of the page. It was developed by Tim Berners-Lee in 1992.[15]

3.3.6 CSS

CSS is a style sheet language which is used to describe the presentation of a file written in a markup language. It’s function is mostly styling web pages which are written in HTML or XHTML.

CSS is designed for enabling separation of file content, which is written in HTML or any other markup language. It improves content accessibility, it provides more flexibility in the specification of presentation characteristics and reduces repetition in the structural content. It is also used to allow web pages to be displayed differently depending on the size of the screen in which is being viewed.

CSS specifies also a priority scheme where it determines which style rules should be applied if more than one rule matches against a particular element. So, according to that, priorities are calculated and assigned to the rules.[16]

3.3.7 JQuery

JQuery is a JavaScript library which works on multiple browsers and it is designed to simplify the Client Side Scripting of Hypertext Markup Language. It is open source software.[17] Nowadays most of the websites has implemented this library to make powerful dynamic pages. Saying this means that this is also one of the most used JavaScript libraries.

It is designed to create animations with advanced effects, make file handling easy, handle events, etc. It is released by John Resig in 2006 in New York in a conference about technology, called “Barcamp”.

3.4 Hardware requirements

Hardware: Pentium based computer with a minimum of P4

RAM Memory: Computer should have minimum of 256 MB of RAM memory

3.5 UML Diagrams

3.5.1 Use Case Diagrams

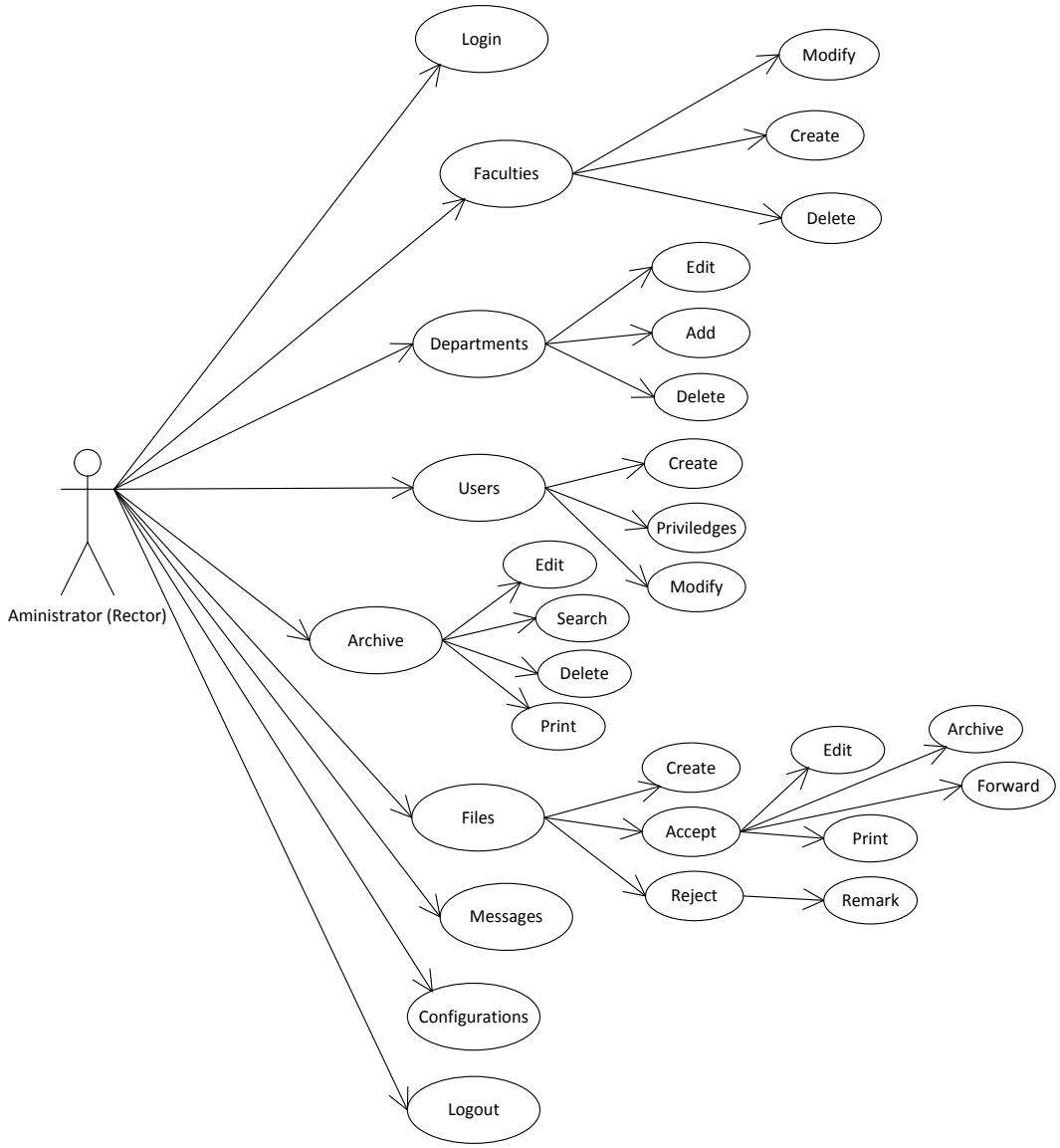


Figure 3.1 - A use case diagram of the Administrator (Super-Administrator)

This module allows the Administrator to create, modify and delete faculties and departments. Also allows the managing of users, files and all other configurations. As you can see from the figure above the actor of this case is the administrator and in order to do any action, a user must be logged in as Administrator. When the job is

done, he/she has to sign out from the system. Below i am showing some of the main scenarios of this module:

*Scenario 1:*User logs in as the system Administrator. The system authenticates him/her if it is the system administrator so that the new arrived files tab is shown to him/her. There the Administrator have two choices in front: to Accept or to Reject a new arrived file. If the file is rejected, it will prompt a message where it asks to write a reason of rejection. In the other way, if the file is accepted it will move to the below section where the Edit, Forward, Convert, Print and Archive actions will be enabled for the Administrator. After the job is done, he/she needs to sign out from the system.

*Scenario 2:*Considering that a user has logged in as Administrator, he/she goes to the Departments tab where the existing Faculties and Departments are shown. There, the Administrator have a privilege to create a new faculty and assign departments to that faculty, edit existing faculties and departments and delete them. If no need for further actions, the user have to sign out.

*Scenario 3:*After the system has authenticated the user as the Administrator, user goes to File Management tab where his created files are shown to him. There, the administrator can create a new file, forward a file and see the status of the forwarded files. If no need for further actions, the user have to sign out.

*Scenario 4:*User logs successfully as the Administrator and goes to the Archive tab where all the archived files are shown to him/her. There he/she can search for a specific file, see the file log, print a file and delete a file. Take in consideration that the user can make an advanced search also. If the user has finished his/her actions, a sign out is required.

*Scenario 5:*After a successful login as the Administrator, user goes to the Message tab where new arrived messages from other users are shown to him/her. There, he/she can compose a message and send to a specific user, can delete a message, can reply to a message or can review other income or sent messages. After the job is finished, he/she have to sign out from the system.

Scenario 6: After the user has logged in as the Administrator, he/she goes to the My Profile tab where his/her personal information are brought in front of him/her. There, he/she can modify/update his/her personal information or can upload a profile picture of his/her own. If he/she don't want to do any further action, the sign out is required.

*Scenario 7:*User logs in as the Administrator. Goes to the Users tab where all existing users and their information are shown to him. In this tab he/she can create a new user, edit or delete an existing one and can give specific user privileges to them. If no other action is to be taken, he/she has to sign out from the system.

*Scenario 8:*User logs in as Administrator. Goes to the Configuration tab where the possible configuration actions take place. There, blocking incoming emails and backing up a database for any security issue are enabled for this user. After the job is done, he/she signs out from the system.

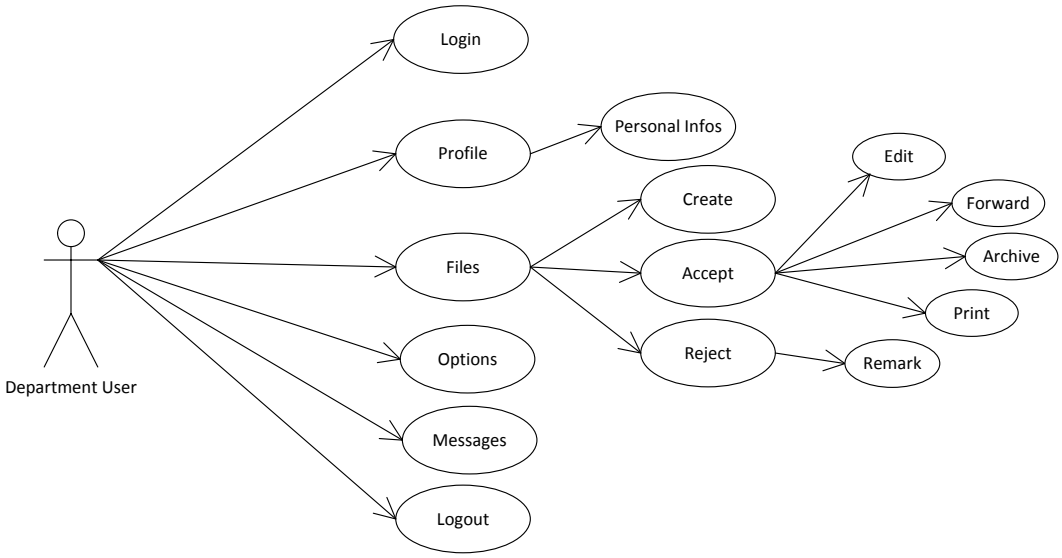


Figure 3.2 - A use case diagram of Chief of Department (Administrator)

The actor of this case, as you can see from the figure above, is the Department user who in most of the cases is the Chief of Department. In this module, the Chief of Department is allowed to create, send for archiving and manage incoming files. He/she can also Have access to his messages and profile. After the job is done, the user have to sign out from the system. Below are shown some of the main user scenarios of this case:

*Scenario 1:*User logs in and the system checks if the logged one is the Chief of Department so that the new arrived files tab is shown to him/her depending on the department hi/she is assigned by the Administrator. A rejection and acceptation right is given to the department user also, so if he/she rejects a file, same as in administrator module, a message for a rejection reason is required. In the acceptation case an Edit, Forward, Print and Send for Archiving button is enabled. After taking his/her decision of what to do with that file, the user have to sign out from the system.

*Scenario 2:*User logs in as Department user. Goes to the File Management tab where his/her created files are shown. There he/she can see the status of the file and because a creation privilege is given to him/her also from the administrator, he/she can create a file too. After the file is created, it can be forwarded, printed or send for archiving. If no need for further actions, the user have to log out from the system.

*Scenario 3:*After a successful login as the Department user and navigation to the Message tab, all income messages are shown to him/her. There the user can compose, reply and send message to other users. After the messages are sent and no other action have to be taken, he/she has to log out from the system.

*Scenario 4:*User logs in as the Department user and goes to My Profile where he/she can update his/her personal information or upload a picture. After the job is done, user logs out from the system.

*Scenario 5:*A Department user logs in and goes to the Configuration tab where he/she can block the incoming emails. If no further action have to be taken, the user logs out.

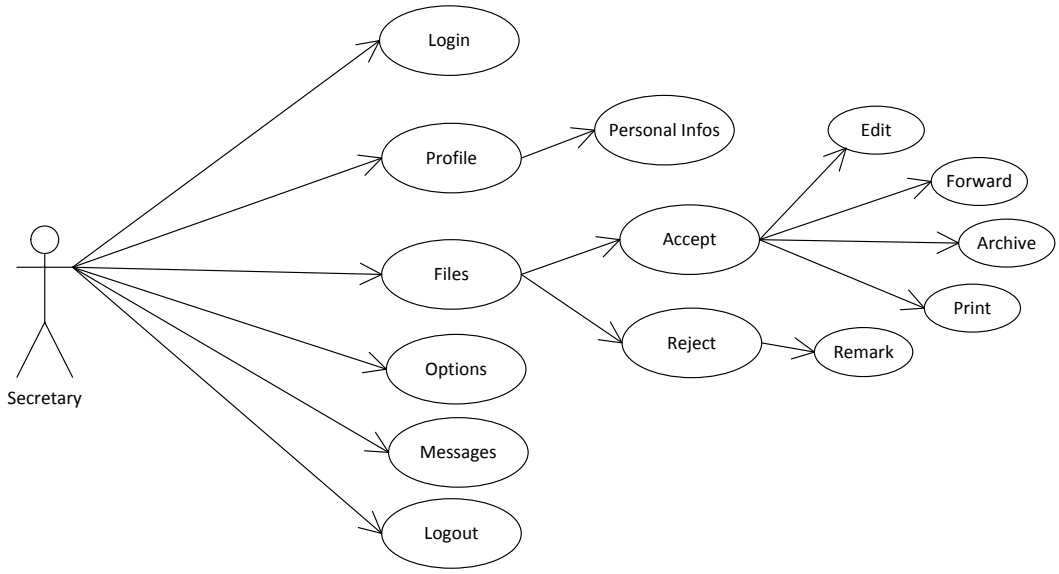


Figure 3.3 - A use case Diagram of Secretary (User)

This module is the module with a fewer privileges. Its main actor is the Secretary user. It allows the Secretary to edit, forward, send for archiving and manage incoming files. A file creation privilege is not given to this module, so the user of this module cannot create his/her own files, instead can manage the incoming ones. As the other modules when the job is finished, here also the user has to log out from the system. Below I listed some of the main user scenarios of this case.

*Scenario 1:*User logs in and the system checks if it is the Secretary user. When a login is completed, the income files are shown to him/her. A privilege for acceptation and rejection is given to this module also. So the user of this module, as other modules, can accept or reject a file in same manner. In case of acceptance here also the same buttons such as: Edit, Forward, Print and Send for Archiving is shown. When the user has made his/her decision and has to do no other action, the log out from the system is required.

*Scenario 2:*User logs in as the Secretary. Goes to the message tab where income and sent messages are shown to him/her. There he/she can compose, reply and send messages to the users of the system. The log out, after the job is done, is required.

*Scenario 3:*After the successful login as Secretary user and navigation to My Profile tab, a form with that users information is shown. There the user can edit and update his/her profile information or upload his/her own profile picture. If no further action has to be taken, log out is required.

3.5.2 Activity Diagrams

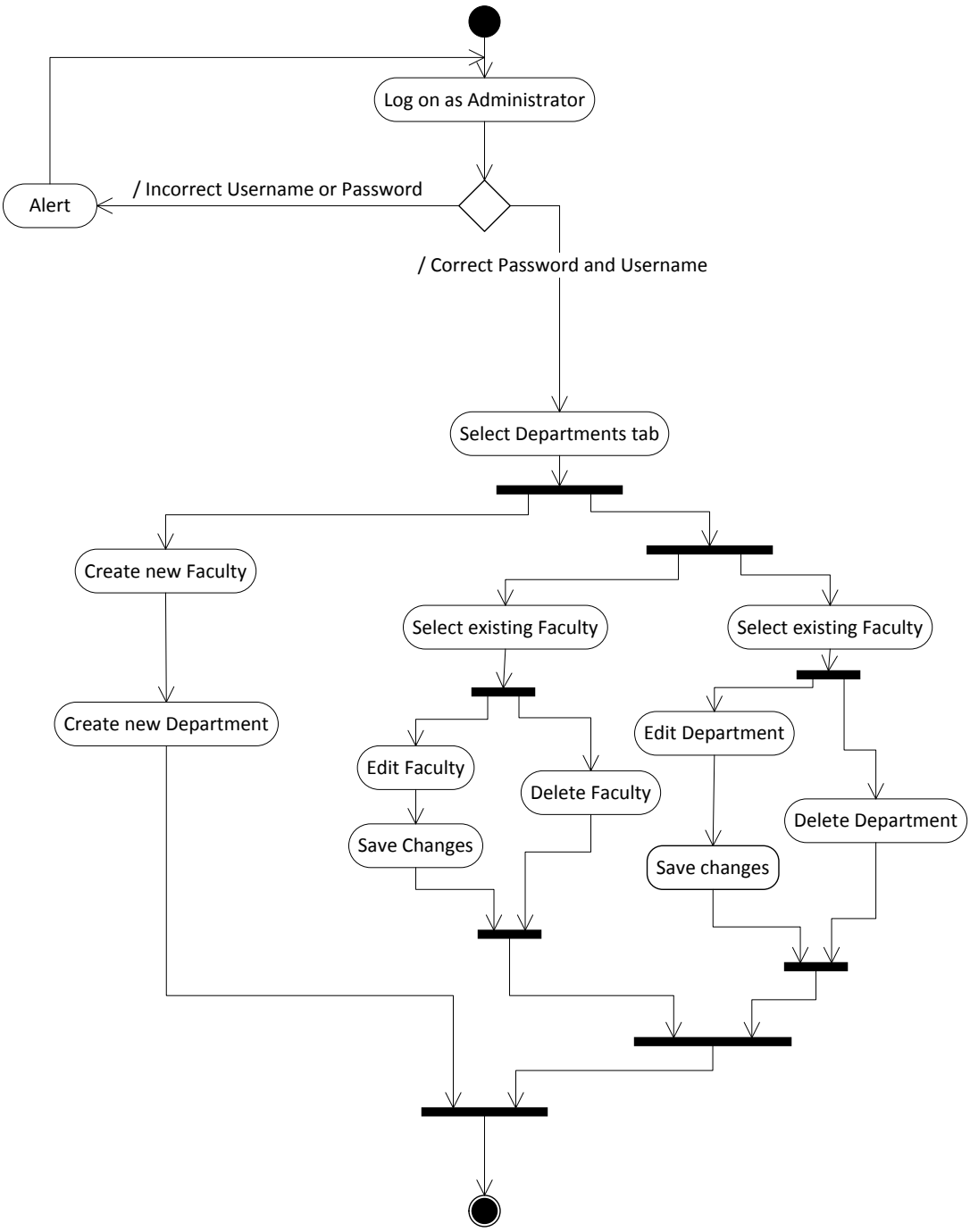


Figure 3.4 - Activity diagram of Faculties and Departments Management

As you can see from the figure above, an activity diagram of faculties and departments is shown. Here the diagram explains how the hierarchy of a university is built. Creating faculties and departments and managing of those can be done only

by the Administrator of the system. Firstly he creates a faculties. After the creation of faculties he/she has to create departments and assign them to their specific faculty. Notice that, he/she cannot create departments if there is no faculty created at all and he/she cannot delete a faculty before the deletion of all the departments of that faculty. After the creation is made, he/she can manage all of them as he/she wants. For seeing other activity diagrams, please refer to the Appendix A1.

3.5.3 Swimlane Diagrams

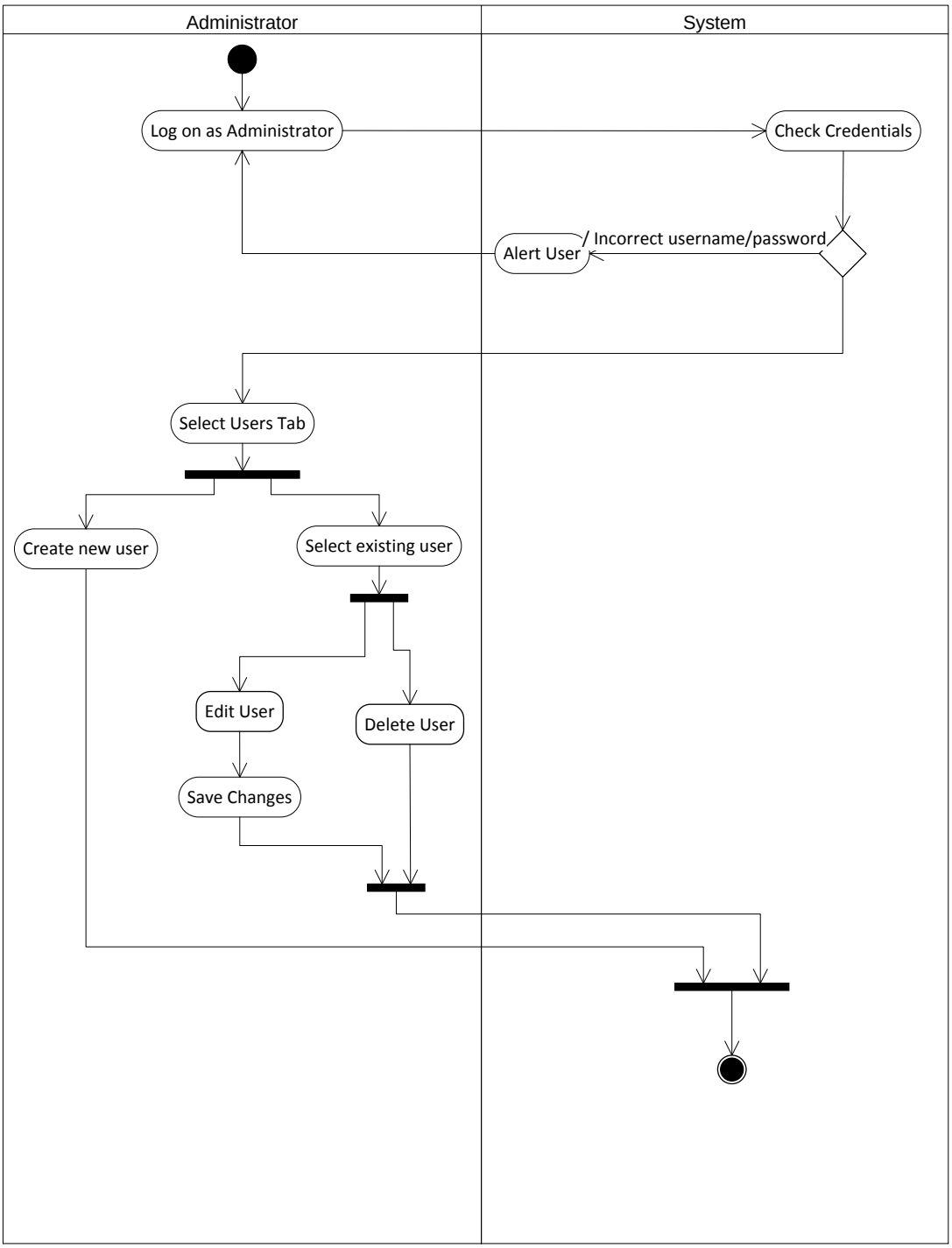


Figure 3.5 - Swimlane Diagram for User Management

As you can see from the figure above, a swimlane diagram of user management is shown. It explains the road which the user follows in order to login to the system and the road of user creation. So as you can see firstly the user writes the username

and password and the system checks in database if the user with those credentials exists. If the user doesn't exist it returns him/her to the login page showing a wrong credentials written message. Otherwise if the user exists it redirects him to the main page where he navigates to users tab and manage them. Other than deleting and editing existing users, he/she can create also a new user. Notice that only Administrator of the system has privileges to create and manage users. For other swimlane diagrams, please refer to Appendix A2.

3.5.4 Sequence Diagrams

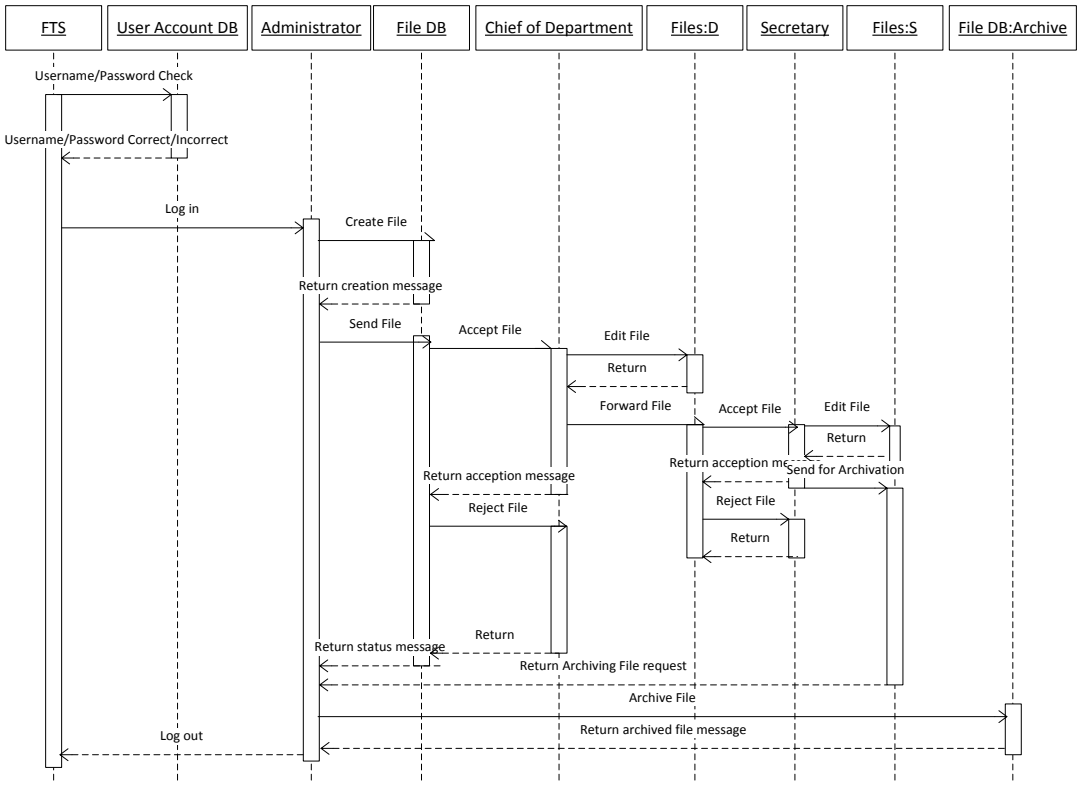


Figure 3.6 - Sequence Diagram of File Management

In the figure above a sequence diagram for file management is shown. A road from creation, through forwarding till the archiving of file is explained. As you can

understand firstly a file is created from the Administrator and forwarded to the Department user who reviews the file for further proceeding. If the file is rejected it will require to write a reason of rejection and go back to the creator of that file. In other case, if the file is accepted from the taker (in this case Department user) it is edited if needed and send for archiving where the Administrator has to review the changes. If the file is modified properly, he/she can print or archive it. Notice that only the Administrator has the privilege to archive files.

Other than archiving, if file needs to be reviewed from the Secretary also, the Department user forwards it to the Secretary user where he/she has to review it before accepting or rejecting. Here also in case of rejection, a remark or rejection reason has to be written. In the other hand if the file gets the final hand from the Secretary user and no need for further modification, he/she can print it also and send it for archiving to the Administrator. From here, all the responsibilities for that file are Administrator responsibilities. For other sequence diagrams please refer to Appendix A3.

3.5.5 Class Diagrams

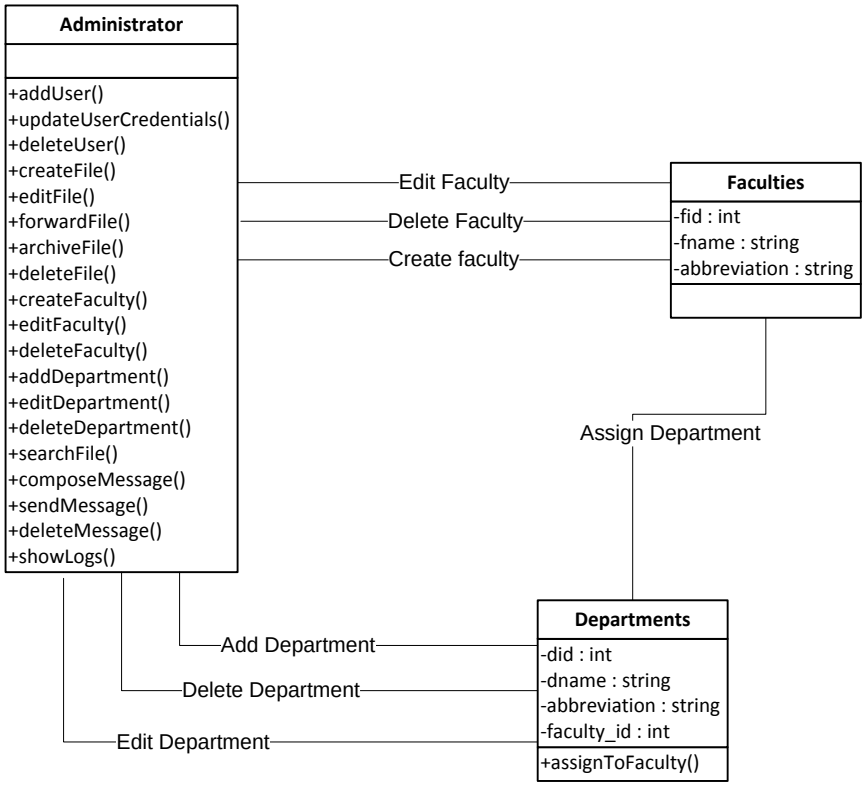


Figure 3.7 - Class Diagram of Faculty and Department

The figure above is a class diagram of faculty and department management. It shows the relationship between the Administrator, Faculty and Department. Other than this it shows the model elements such as classes and types. For other class diagrams please refer to Appendix A4.

3.5.6 Component Diagrams

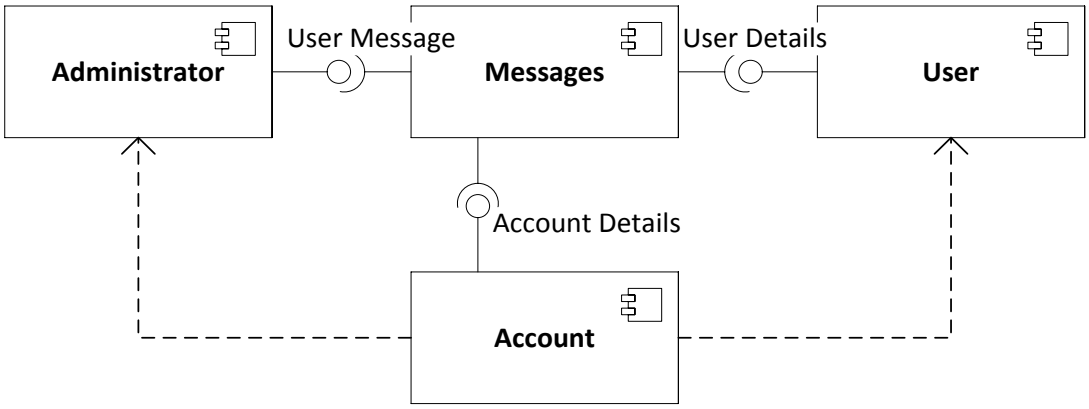


Figure 3.8 - Component Diagram of User Messages

The figure above describes how the user messages work. As you can understand, in order to send a specific message to a user of the system, a login is required. When the user logs in, the system takes his/her account information and compares them with the ones in database. When the user is authenticated, he/she is able to send a message to any user of the system. User details are kept when a message is sent, in order to see from whom the message came. For other component diagrams please refer to Appendix A5.

3.5.7 Deployment Diagrams

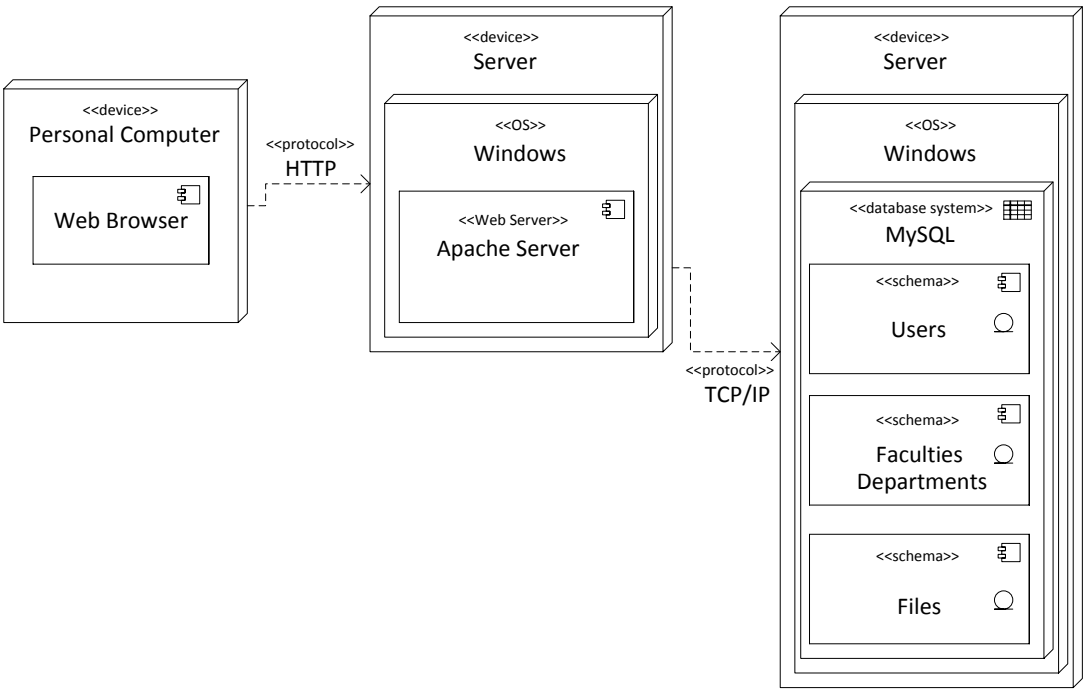


Figure 3.9 - Deployment Diagram showing execution of the system

In the figure above you can see a deployment diagram of the system execution. The user sends a specific request from the web application to the server via HTTP protocol. There the request is analyzed and send to the Mysql Database if needed. When a process is finished with the execution, it comes back to the user and is shown to him as an interface from the web browser. To see another deployment diagram of this File Tracking System, please refer to Appendix A6.

3.5.8 Object Diagrams

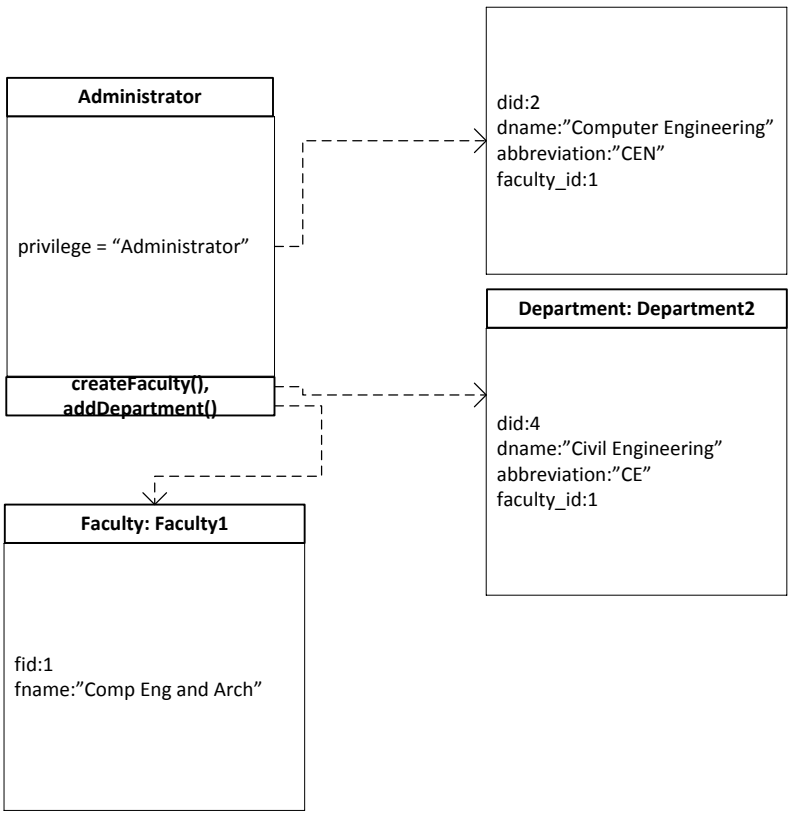


Figure 3.10 - Object Diagram of Faculty Creation and Department Assignment

The figure below is an object diagram showing how the faculty is created from the system and how the department is assigned to the required faculty. When the faculty is created from the administrator, a specific id is given to it. This id will be the differentiator between faculties. So when the department will be required to be assigned to a specific faculty, it will use this id to find the proper faculty. For more Object Diagrams, please refer to Appendix A7.

Chapter 4

Implementation

In order to make this web application and optimize it to work in fastest and best manner, the MVC architecture has been used. Most of the work (programming) is done by PHP because it gives a lot flexibility to the user(programmer) by providing a lot of functionalities and possibilities. Also it is considered as one of the most used programming languages.

For structuring database the MYSQL has been used because it is one of the most powerful database and it is widely used. HTML and CSS are ones that are used to structure the design of this web application. They are quite easy in implementing and provide a lot of functionalities. Jquery and Javascript has been used in order to create some interactions on the web application.

4.1 Database Structuring

Database is the key of any web or software application. Without the database you cannot achieve any application you want. Structuring a database and optimizing it plays a major role in your application. A good structuring of database means a good normalization which reduces useless data and redundancy from the database.

id	int(11)	PRIMARY_KEY	AUTO_INCREMENT
case_nr	varchar(255)		
subject	varchar(255)		
content	text		
description	text		
remarks	text		
priority	tinyint(4)		
date_created	datetime		
creator_id	int(11)	FOREIGN_KEY	
sender_id	int(11)	FOREIGN_KEY	
state	varchar(2)		
warn	tinyint(1)		
receiver_id	int(11)	FOREIGN_KEY	

Figure 4.1 - Overview of Files Table

id	int(11)	PRIMARY_KEY	AUTO_INCREMENT
first_name	varchar(255)		
last_name	varchar(255)		
username	varchar(255)		
password	varchar(255)		
email	varchar(255)		
address	text		
phone	varchar(255)		
websites	varchar(255)		
linkedin	varchar(255)		
fcb	varchar(255)		
google	varchar(255)		
twitter	varchar(255)		
work	text		
education	text		
bio	text		
date	datetime		
role	tinyint(1)		
profile_pic	varchar(255)		

Figure 4.2 - Overview of Users Table

id	int(11)	PRIMARY_KEY	AUTO_INCREMENT
log	varchar(255)		
date	datetime		
file_id	int(11)	FOREIGN_KEY	

Figure 4.3 - Overview of Files Movement Logs Table

4.2 Server Side

Codeigniter, which is a PHP framework is used to maintain the functionality of FTS. With codeigniter the code is cleaner and easy to be maintained, especially when working with big and complex web applications.

```
function new_file(){

    $data['page_title'] = 'Create New File';
    $data['content'] = 'new_file_view';

    $user_results = $this->users_model->select_user_by_id($this->session->userdata('id'));
    $data['role'] = $user_results->role;

    $data['users_query'] = $this->users_model->select_all_users();

    if ($this->input->post('submit_file')) {

        $this->form_validation->set_error_delimiters('<div class="validation_errors">&#215;', '</div>');
        $this->form_validation->set_rules('case_nr', 'Case Nr.', 'trim|required|max_length[50]');
        $this->form_validation->set_rules('subject', 'Subject', 'trim|required|max_length[50]');
        $this->form_validation->set_rules('content', 'Content', 'trim|required');
        $this->form_validation->set_rules('description', 'Description', 'trim|max_length[1000]');
        $this->form_validation->set_rules('priority', 'Priority', 'trim|required');
        $this->form_validation->set_rules('user_id', 'Send To', 'trim|required');

        if ($this->form_validation->run() == TRUE) {

            $query = $this->files_model->create_file();

            if ($query){
                    // Insert log message
                    $file_id = $this->db->insert_id();
                    $creator_data = $this->users_model->select_user_by_id($this->session->userdata('id'));
                    $sender_data = $this->users_model->select_user_by_id($this->input->post('user_id'));

                    $log_msg = 'Created by: '.$creator_data->first_name.' '.$creator_data->last_name.' and Sent to: '.$sender_data->first_name.' '.$
                        sender_data->last_name;

                    $this->files_model->insert_file_log($log_msg, $file_id);

                $this->session->set_flashdata('file_success_msg', 'File was sent successfully');
                redirect('home');
            }
            else{
                $this->session->set_flashdata('file_fail_msg', 'File failed to Send');
                redirect('new_file_view');
            }
        }
```

Figure 4.4 - new_file method (controller)

This method is a child of class File which extends the Codeigniter controller. The function makes a validation upon a creation of new file, creates a new file or gives the error. When a new file is created it logs the behaviour of that file in the database.

```
function create_file(){
    $this->load->helper('date');

    $data = array(  'case_nr'           =>$this->input->post('case_nr'),
                    'subject'           =>$this->input->post('subject'),
                    'content'           =>$this->input->post('content'),
                    'description'       =>$this->input->post('description'),
                    'priority'          =>$this->input->post('priority'),
                    'date_created'      =>date('Y-m-d H:i:s', now()),
                    'creator_id'        =>$this->session->userdata('id'),
                    'sender_id'         =>$this->session->userdata('id'),
                    'state'             =>'P',
                    'receiver_id'           =>$this->input->post('user_id'),
                    );

    $sql = $this->db->insert('files', $data);

    if ($sql){

        return true;
    }
    else{

        return false;
    }

}
```

Figure 4.5 - create_file method (model)

In order to insert data into the database the controller calls a method from a model. Here the create_file method, when it is called from the controller, inserts the data given to the database and returns the message to the controller.

Data are taken from the fields declared on the view (see fig.4.6).

```
<?php echo form_open('files/new_file');?>
<!-- Form -->
    <div class='form'>
            <p>
                <label>Case Nr<span class='req'>* Max 50 characters</span></label>
                <input type='text' name='case_nr' class='field size5' value='<?php echo htmlentities(set_value('
                    case_nr')); ?>' />
            </p>
            <p>
                <label>Subject<span class='req'>* Max 50 characters</span></label>
                <input type='text' name='subject' class='field size4' value='<?php echo htmlentities(set_value('
                    subject')); ?>' required />
            </p>
            <p>
                <label>Content<span class='req'>*</span></label>
                <textarea name='content' class='ckeditor'><?php echo htmlentities(set_value('content')); ?></
                textarea>
            </p>
            <p class='inline-field'>
                <label>Priority<span class='req'>*</span></label>
                <select name='priority' class='field size3'>
                    <option value='1'>Normal</option>
                    <option value='2'>High</option>
                </select>
            </p>
            <p>
                <label>Description<span>*</span><span class='req'>Max 1000 characters</span></label>
                <textarea name='description' class='field size2'><?php echo htmlentities(set_value('description'));
                    ?></textarea>
            </p>
```

Figure 4.6 - new_file_view page (view)

4.3 Demonstration

When FTS loads it will prompt a login form where requires the user to enter the username and password.

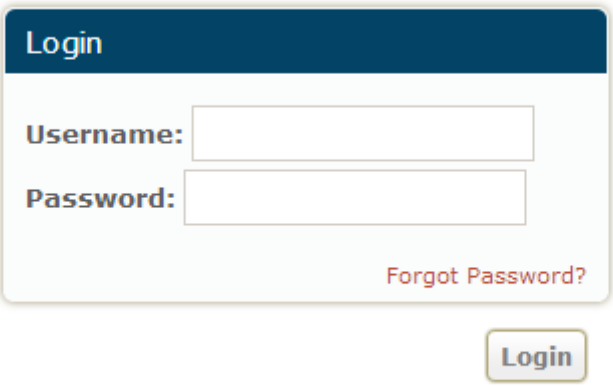


Figure 4.7 - Login form

After a successful login, depending on the user credentials, the Dashboard of income files will be shown (see fig.4.8). Because the current user have full privileges, other than accepting or rejecting a file, he/she can also archive that file directly.

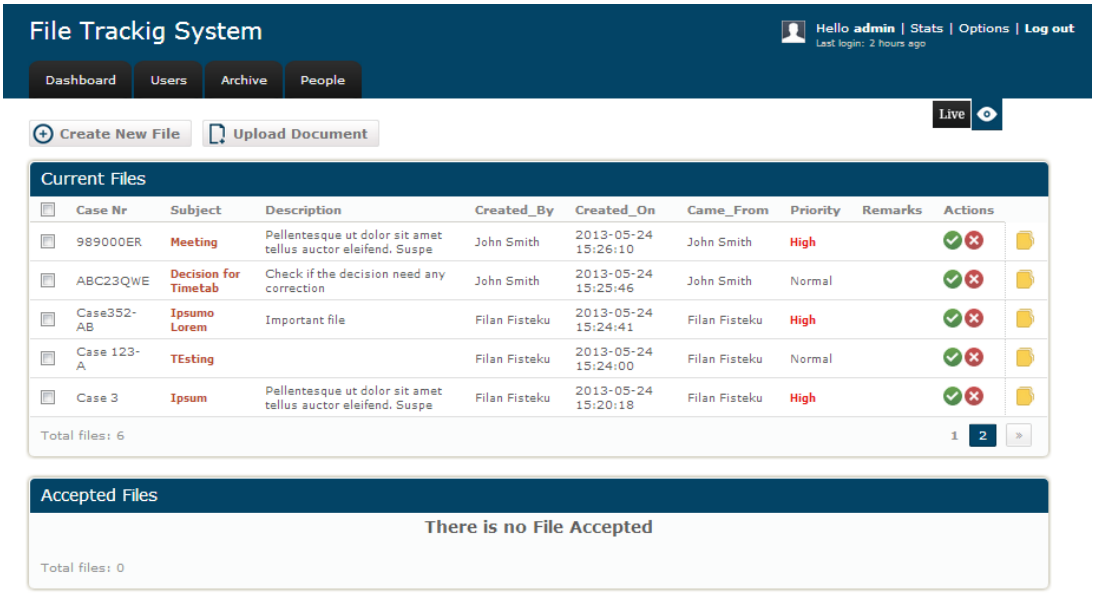


Figure 4.8 - Dashboard of user with all privileges

For every file user have two choices : Reject and Accept the file. In case of rejection the user has to write the reason of rejection(see fig.4.9) while in acceptation case actions(such as edit, forward, send for archive, print, etc) are enabled(see fig.4.10).

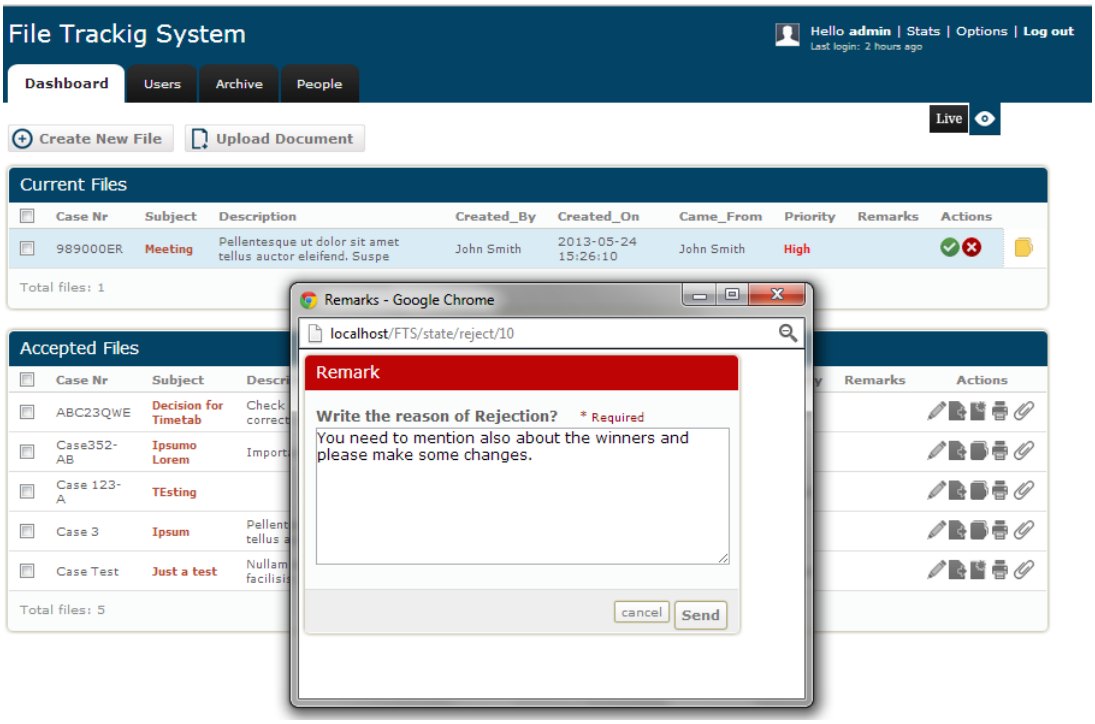


Figure 4.9 - File rejection

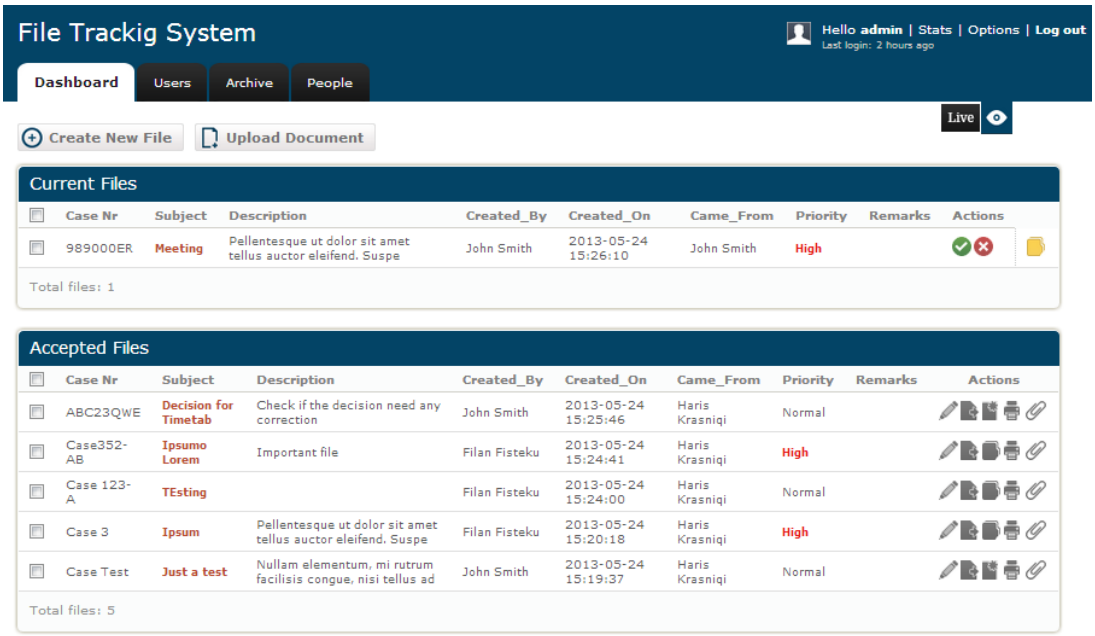


Figure 4.10 - Accepted files

Depending on the action that user wants to take every button plays a specific action.

Edit allows to edit the current file, send for archive prompts with a popup containing names of users with a right to archive files (see fig.4.11), forward prompts with a popup containing the names of a system users, print generates the file in PDF format and allows to print it directly from the

browser(see fig.4.12) and download generates the file in PDF format and prompts the user with a message to chose the path for downloading that file.

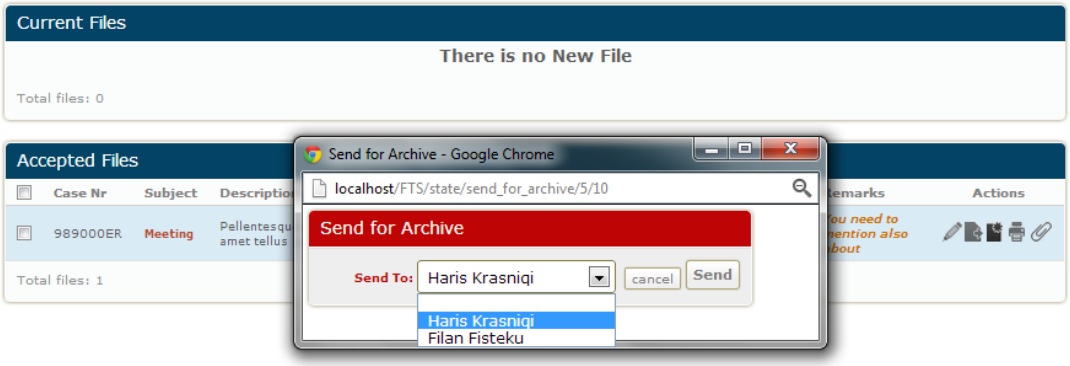
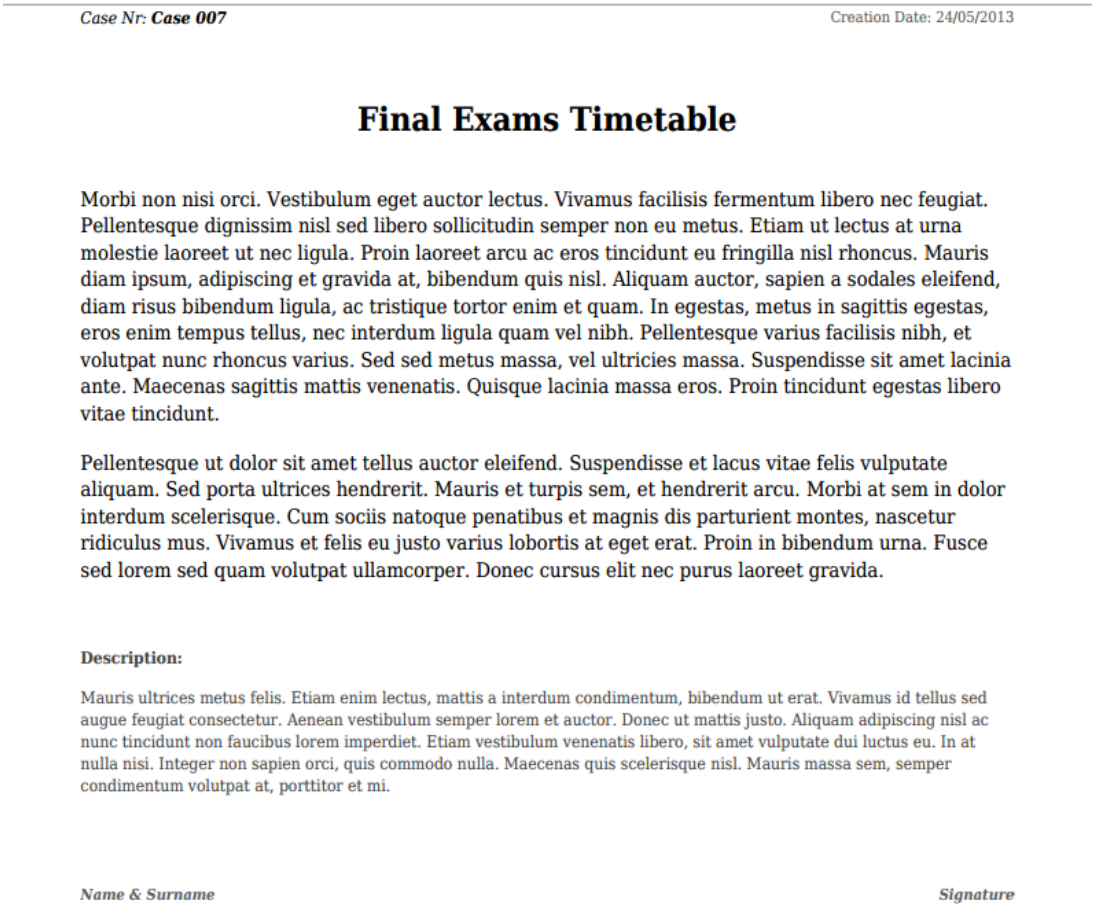


Figure 4.11 - Sending file for archive



Case Nr: ***Case 007*** Creation Date: 24/05/2013

Final Exams Timetable

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Pellentesque ut dolor sit amet tellus auctor eleifend. Suspendisse et lacus vitae felis vulputate aliquam. Sed porta ultrices hendrerit. Mauris et turpis sem, et hendrerit arcu. Morbi at sem in dolor interdum scelerisque. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Vivamus et felis eu justo varius lobortis at eget erat. Proin in bibendum urna. Fusce sed lorem sed quam volutpat ullamcorper. Donec cursus elit nec purus laoreet gravida.

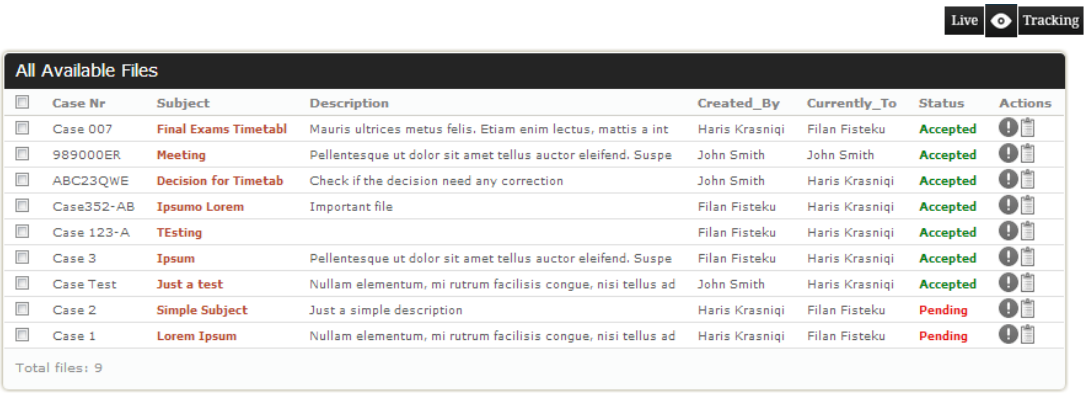
Description:

Mauris ultrices metus felis. Etiam enim lectus, mattis a interdum condimentum, bibendum ut erat. Vivamus id tellus sed augue feugiat consectetur. Aenean vestibulum semper lorem et auctor. Donec ut mattis justo. Aliquam adipiscing nisl ac nunc tincidunt non faucibus lorem imperdiet. Etiam vestibulum venenatis libero, sit amet vulputate dui luctus eu. In at nulla nisi. Integer non sapien orci, quis commodo nulla. Maecenas quis scelerisque nisl. Mauris massa sem, semper condimentum volutpat at, porttitor et mi.

Name & Surname ***Signature***

Figure 4.12 - File generated in PDF

Super Administrators and Administrators have the right to access live tracking where files currently in work are shown with their information (to whom it is currently) and status (if it is accepted or pending). So if a file was not returned in time they can warn the user that is currently holding that file(see fig.4.13).



Case Nr	Subject	Description	Created_By	Currently_To	Status	Actions
Case 007	Final Exams Timetabl	Mauris ultrices metus felis. Etiam enim lectus, mattis a int	Haris Krasniqi	Filan Fisteku	Accepted	
989000ER	Meeting	Pellentesque ut dolor sit amet tellus auctor eleifend. Suspe	John Smith	John Smith	Accepted	
ABC23QWE	Decision for Timetab	Check if the decision need any correction	John Smith	Haris Krasniqi	Accepted	
Case352-AB	Ipsumo Lorem	Important file	Filan Fisteku	Haris Krasniqi	Accepted	
Case 123-A	TEsting		Filan Fisteku	Haris Krasniqi	Accepted	
Case 3	Ipsum	Pellentesque ut dolor sit amet tellus auctor eleifend. Suspe	Filan Fisteku	Haris Krasniqi	Accepted	
Case Test	Just a test	Nullam elementum, mi rutrum facilisis congue, nisi tellus ad	John Smith	Haris Krasniqi	Accepted	
Case 2	Simple Subject	Just a simple description	Haris Krasniqi	Filan Fisteku	Pending	
Case 1	Lorem Ipsum	Nullam elementum, mi rutrum facilisis congue, nisi tellus ad	Haris Krasniqi	Filan Fisteku	Pending	

Figure 4.13 - Live tracking of files on work

Super Administrator and Administrator can also access the archive tab, which holds the archived files. They can also see also the specific file movement/behaviour and delete them(see fig.4.14). Notice that when the file is deleted, actually it is only hidden and still in the database and the only one who can access those “deleted” files, is super administrator.

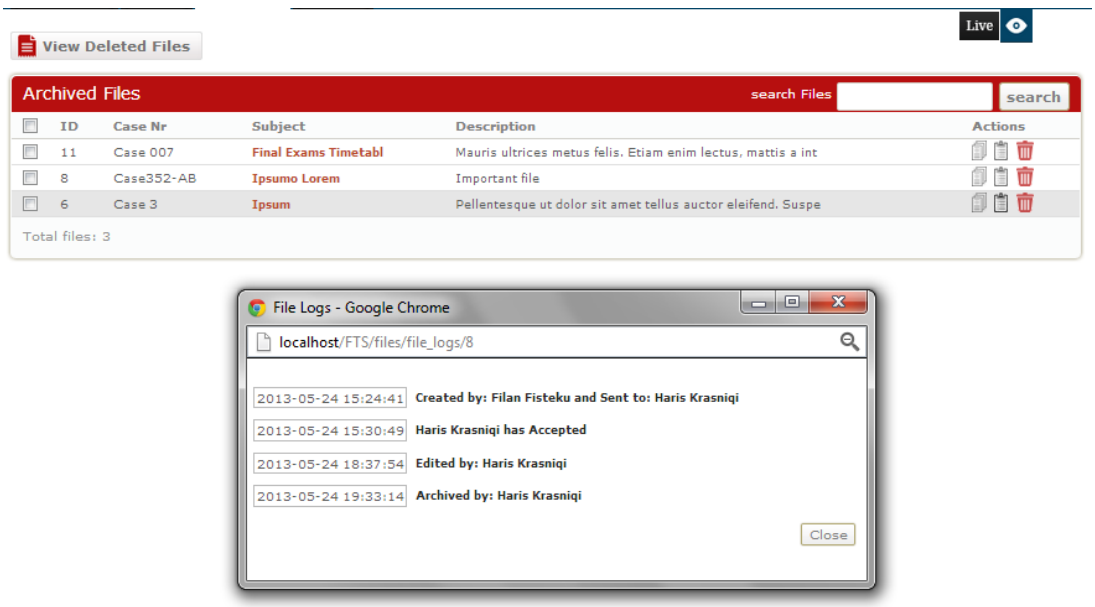


Figure 4.14 - Archived files

Users management is available only from Super Administrator(see fig.4.15), while every user can manage their own profile(see fig.4.16).

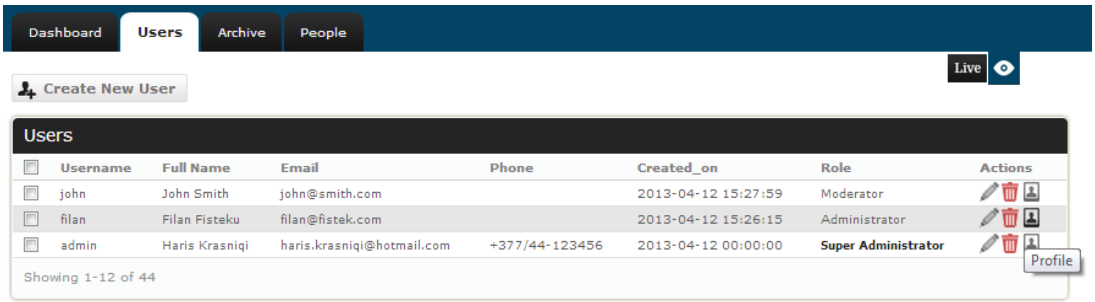


Figure 4.15 - Users tab

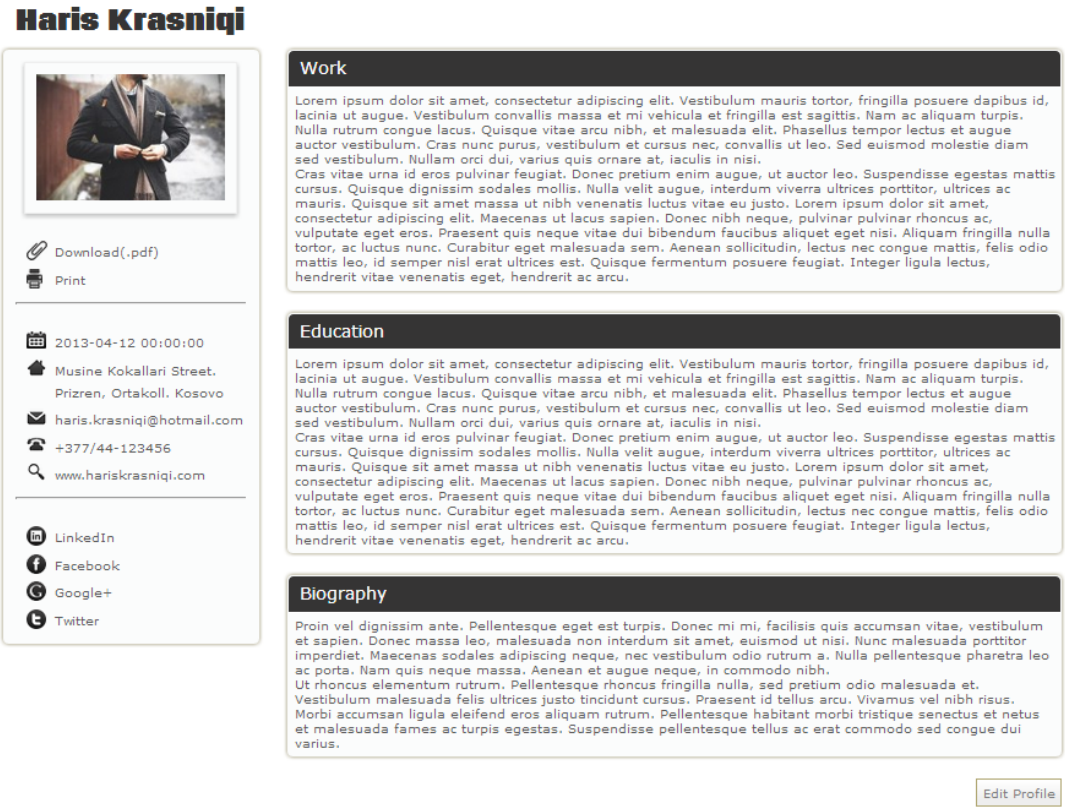


Figure 4.16 - User profile

Chapter 5

Conclusion and Future Work

This paper has discussed about a Web Application which aims to serve offices that has to do with paper work, especially universities, in the best way possible. The goal of this web application is to improve file management, increase staff efficiency, save staff energy and time, reduce cost and improve the work efficiency by using the latest and fastest technologies. The one important thing that needs to be mentioned in this conclusion is that from the research I have done on file tracking systems, there is no file tracking system developed or implemented for universities at all. There are some file tracking systems used for some other purposes (ex: governmental purpose) implemented in few countries, however they are also some simple ones who tracks only receipts. Hence, I took this condition as a favour and hope that the project I am developing will have a massive usage worldwide in the near future.

Other than this, I am planning to improve this web application with new and powerful functions in the future works. One of the improvements in the future will be a cross platform where I will develop a mobile application of this version so the users could access their files also from their smart phones. Another implementation that I am planning to do is also to make this file tracking available not only for universities but also for hospitals, police stations and for all other companies that have a lot of paper work.

So as much as this web application improves, that much paper work time and energy will be reduced and automatically trees will also be saved.

List of References

[1] J. Anne, “FILETACTICS - File Tracking Software and System,” Wordpress, 11 July 2012. [Online]. Available: http://blog.filetactics.com/.

[2] T. Mikkonen and A. Taivalsaari, “Apps vs. Open Web: The Battle of the Decade,” Oulu, 2010.

[3] T. Mikonen and A. Taivalsaari, “The Web as a Platform: The Saga Continues,” in *Proceedings of the 37th EUROMICRO Conference on Software Engineering and Advanced Applications*, Oulu, IEEE Computer Society, 2011, pp. 170-174.

[4] P. Pop, “Comparing Web Applications with Desktop Applications: An Empirical Study,” Linköping University, Linköping, 2002.

[5] A. Taivalsaari, “Mashware: The Future of Web Applications,” Sun Microsystems Laboratories, New Jersey, 2009.

[6] M. Richards, “Web Based vs. Desktop Based Software for Self Storage,” Hi-Tech Smart Systems, Inc, Honolulu County, 2011.

[7] D. G. Bakshi, “KERALA GOVT NOD FOR ONLINE FILE TRACKING,” Alphabet Media, 22 August 2011. [Online]. Available: http://www.futuregov.in/.

[8] R. Chaladan, “File Tracking System for State Government Offices,” 11 August 2010. [Online]. Available: http://www.sics.kerala.gov.in.

[9] N. DoPT, “File Tracking System: User Manual,” MADHYA PRADESH FOREST DEPARTMENT, Bhopal, 2013.

[10] Infronics, “Files Management System,” Infronics Systems, 2011.

[11] P. Staff, “PHP: What can PHP do?,” 04 January 2013. [Online]. Available: http://php.net/manual/en/intro-whatcando.php.

[12] O. Corporation, “MySQL :: About MySQL,” 2013. [Online]. Available: http://www.mysql.com/about/.

[13] D. Smith, “About Javascript,” 30 October 2012. [Online]. Available:

https://developer.mozilla.org/en-US/docs/JavaScript/About_JavaScript.

[14] M. Jazayeri, “Some Trends in Web Application Development,” USI, Lugano, 2007.

[15] W3C, “Conformance: requirements and recommendations,” [Online]. Available: http://www.w3.org/TR/html401/conform.html.

[16] W3C, “HTML & CSS,” [Online]. Available: http://www.w3.org/standards/webdesign/htmlcss#whatcss.

[17] j. Foundation, “jQuery Project,” 2012. [Online]. Available: http://jquery.org.

[18] T. Mikkonen and AnteroTaivalsaari, Web Applications - Spaghetti Code for the 21st Century, USA: Sun Microsystems, 2007.

Appendix A

UML Diagrams

A.1 Activity Diagrams

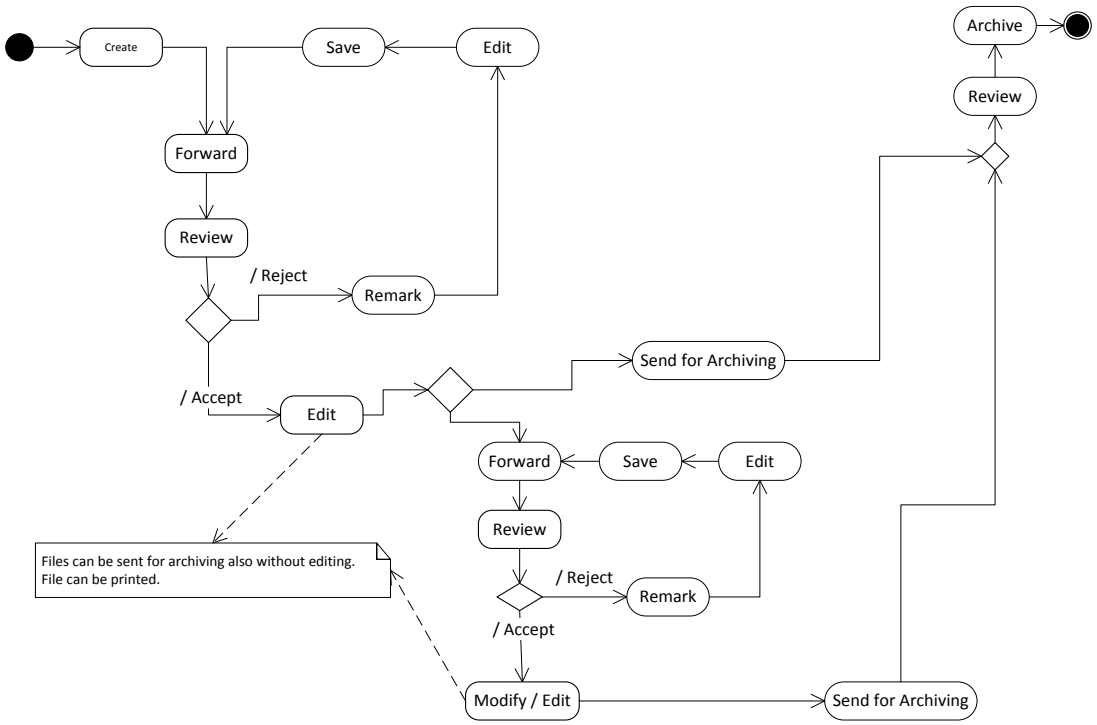


Figure 0.1 - Activity Diagram for File Management

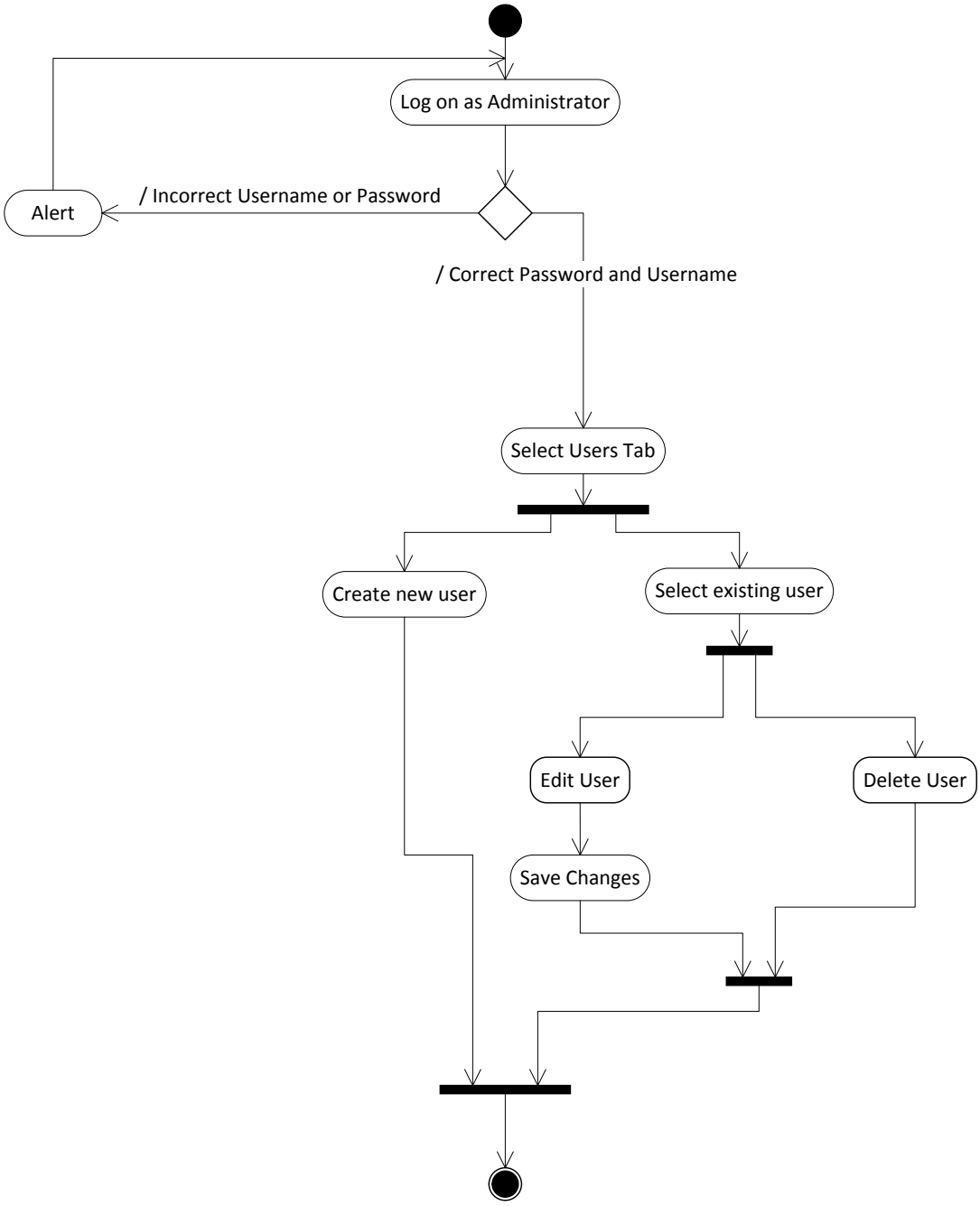


Figure 0.2 - Activity Diagram for User Management

A.2 Swimlane Diagrams

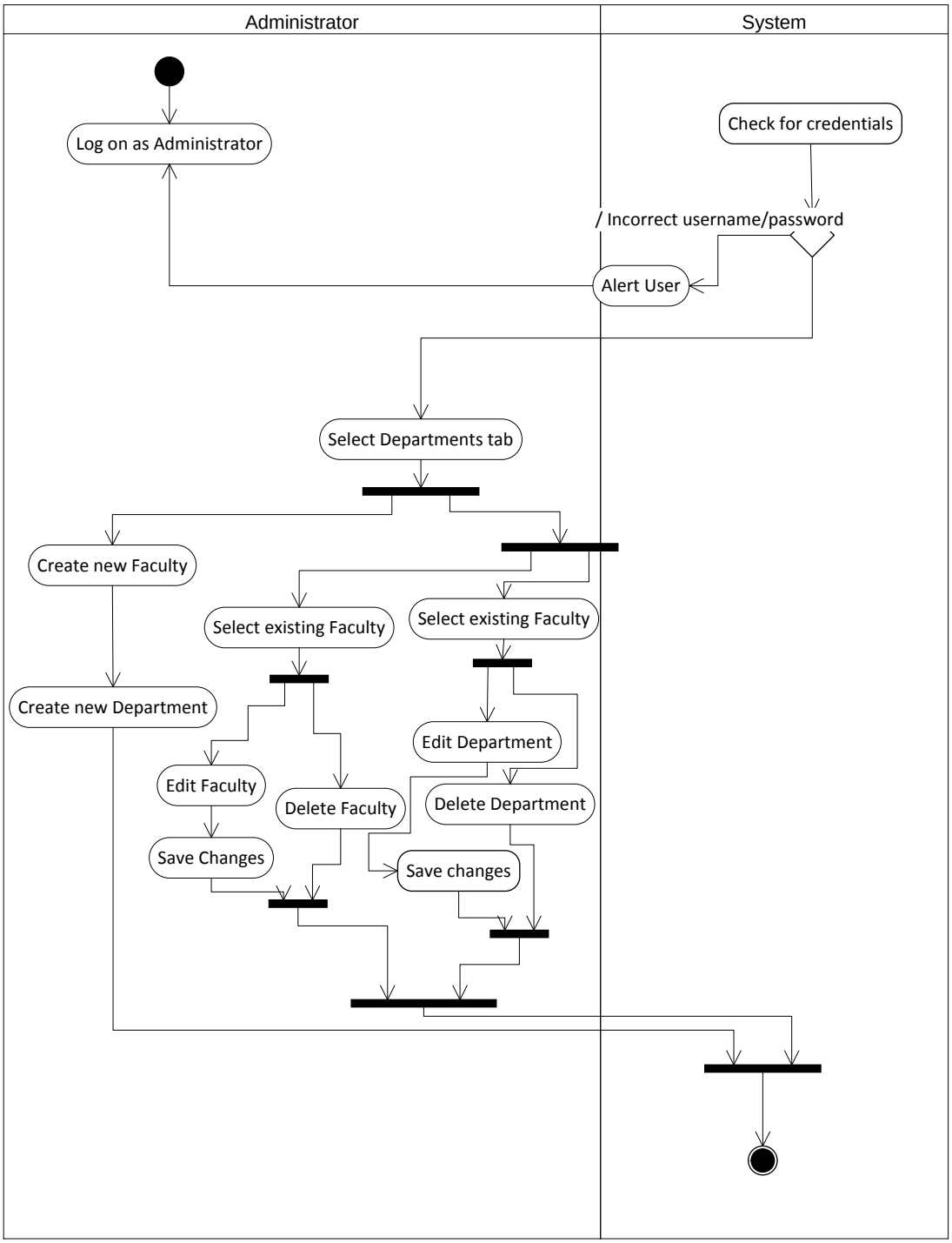


Figure 0.3 - Swimlane Diagram of Faculty and Department Management

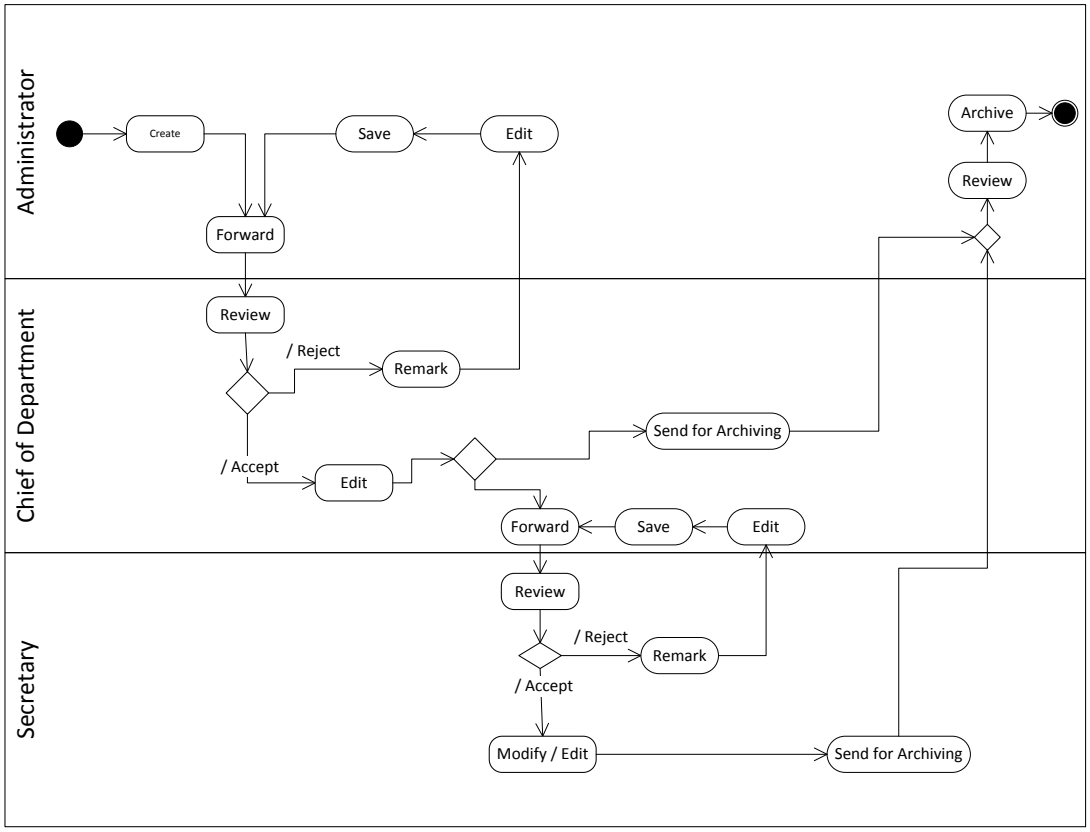


Figure 0.4 - Swimlane Diagram of File Management

A.3 Sequence Diagrams

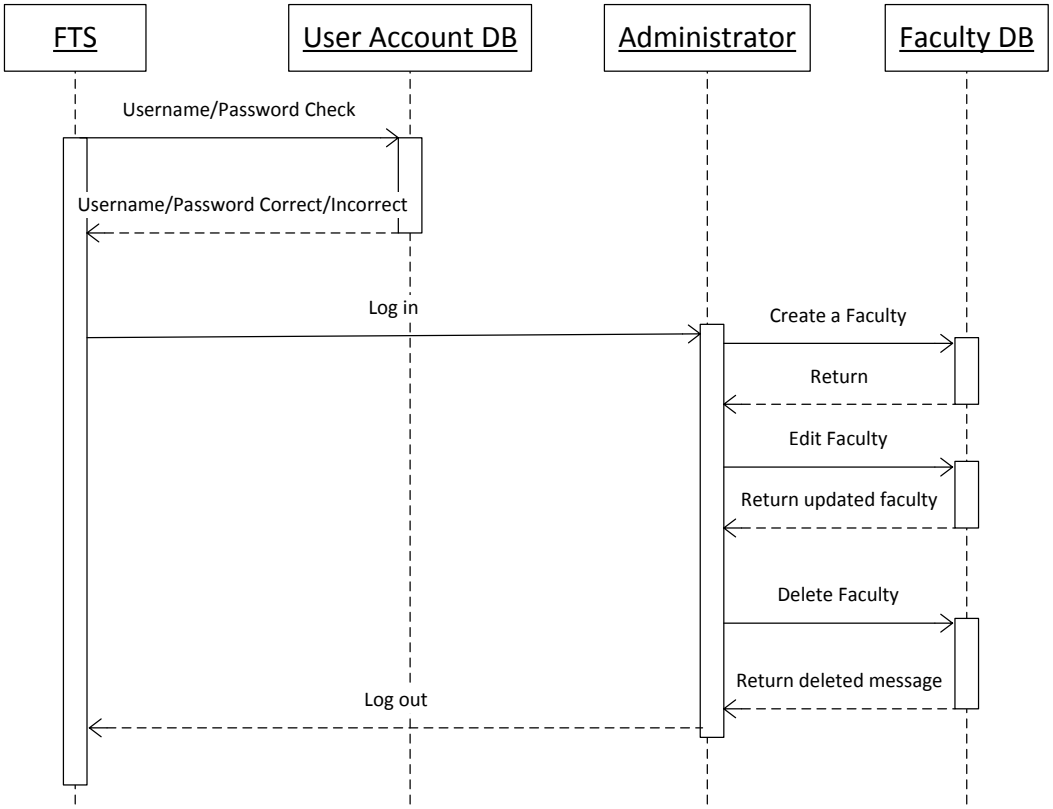


Figure 0.5 - Sequence Diagram for Faculty Management

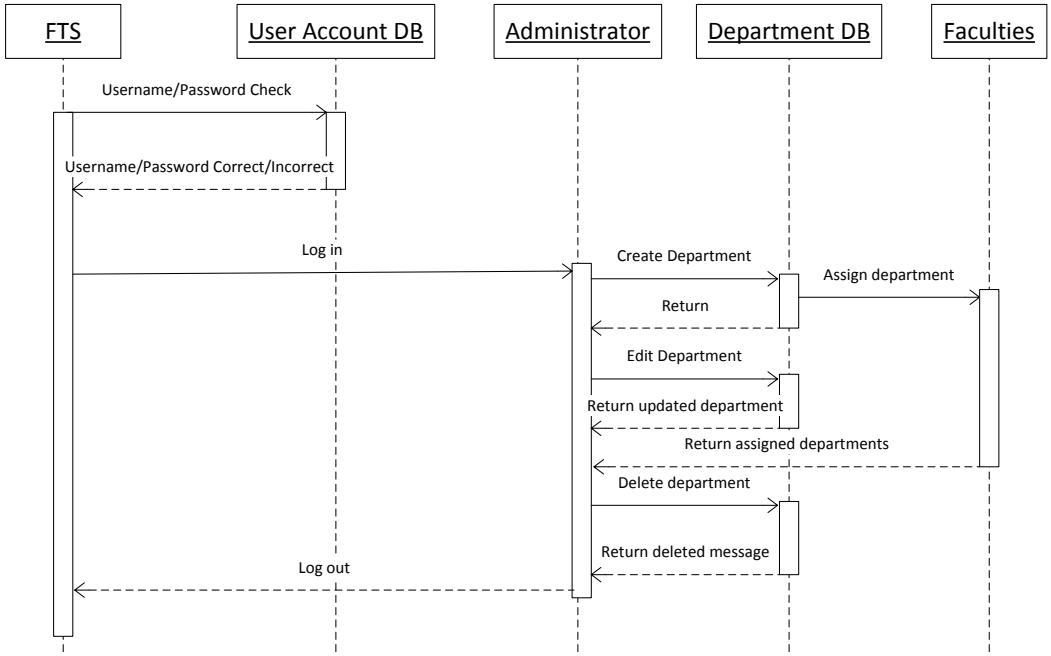


Figure 0.6 - Sequence Diagram for Department Management

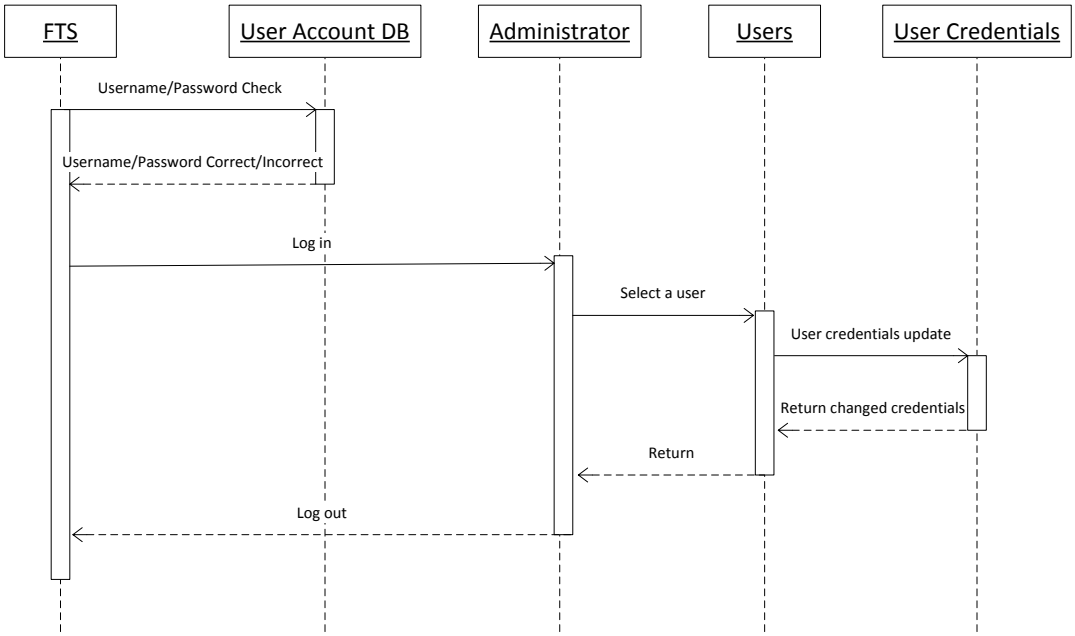


Figure 0.7 - Sequence Diagram for User Management

A.4 Class Diagrams

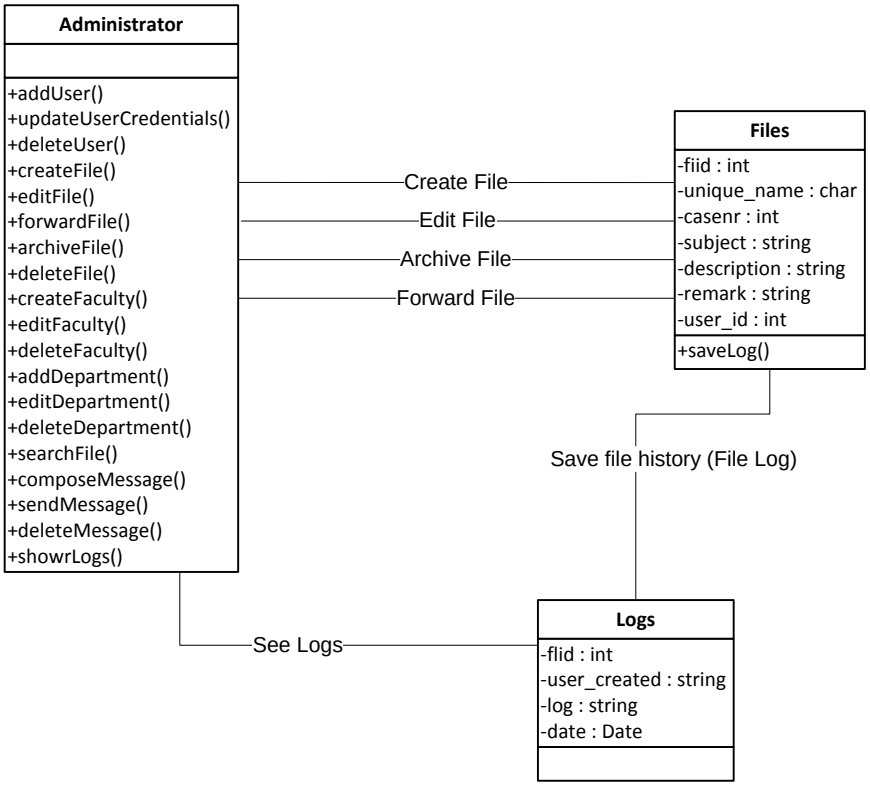


Figure 0.8 - Class Diagram showing relationship between User and File

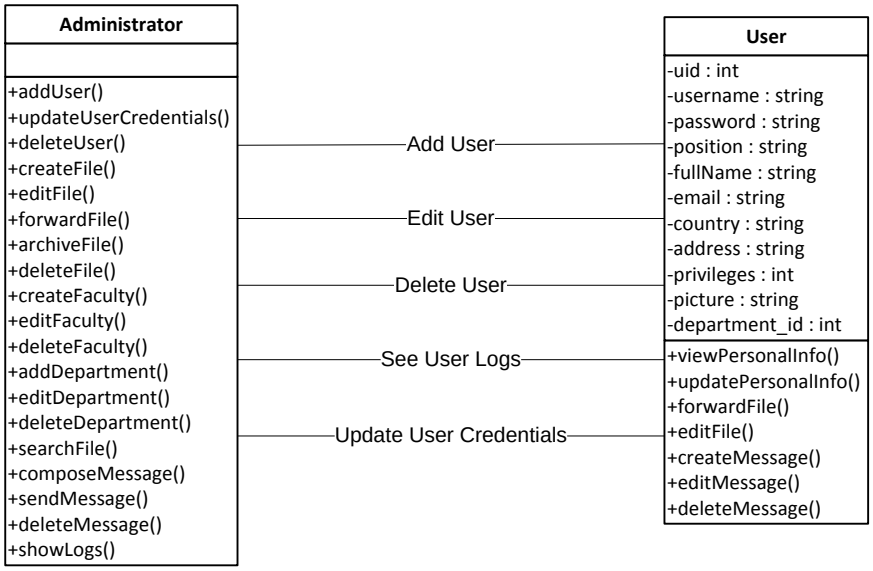


Figure 0.9 - Class Diagram of User Management

A.5 Component Diagrams

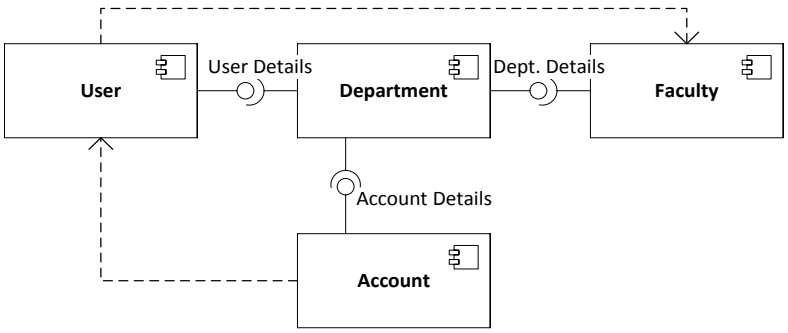


Figure 0.10 - Component Diagram of Faculty and Department Management

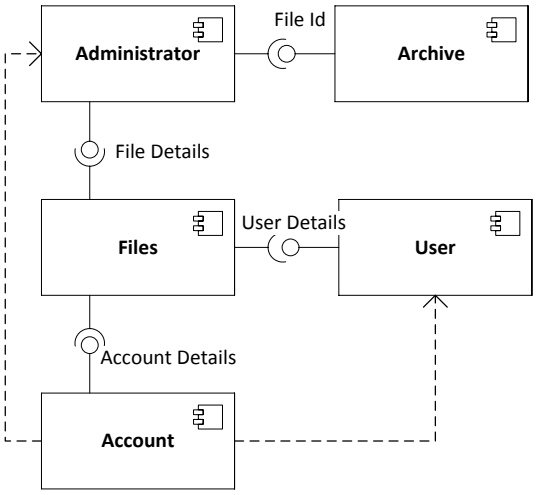


Figure 0.11 - Component Diagram of File Management

A.6 Deployment Diagram

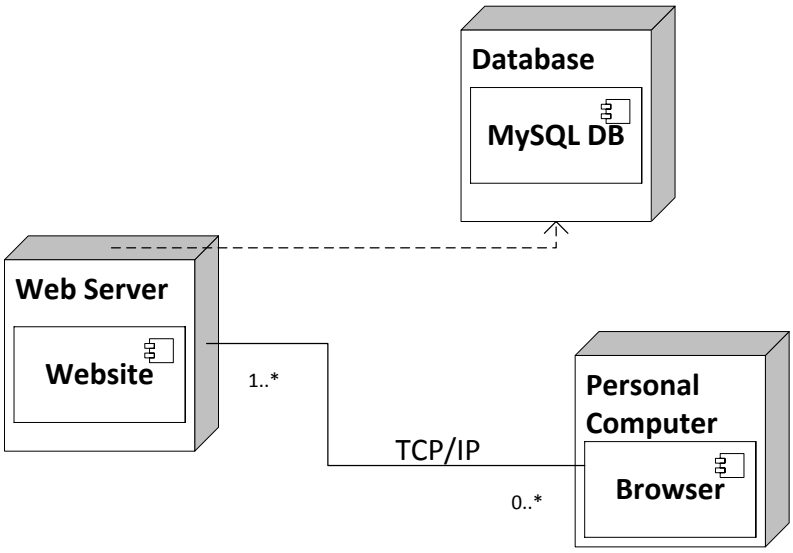


Figure 0.12 - A Deplyment Diagram of FTS System Execution

A.7 Object Diagrams

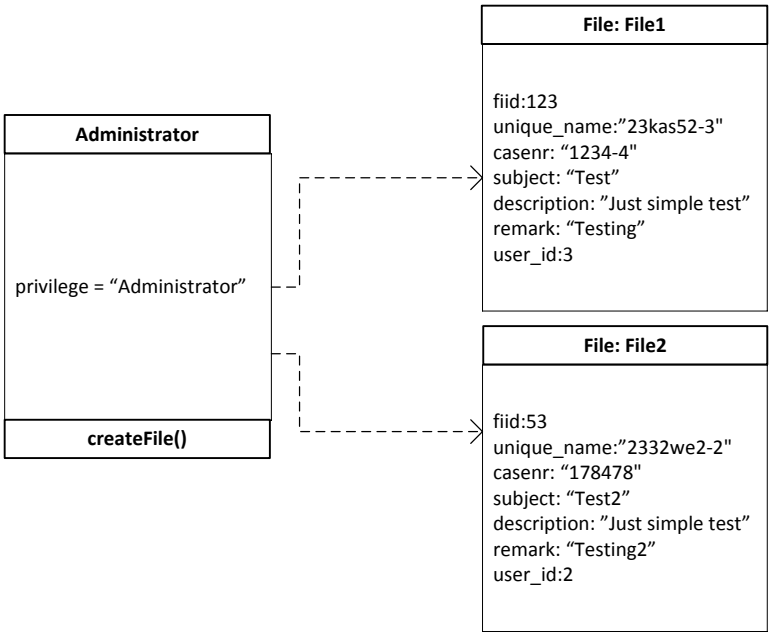


Figure 0.13 - An object Diagram of File Creation

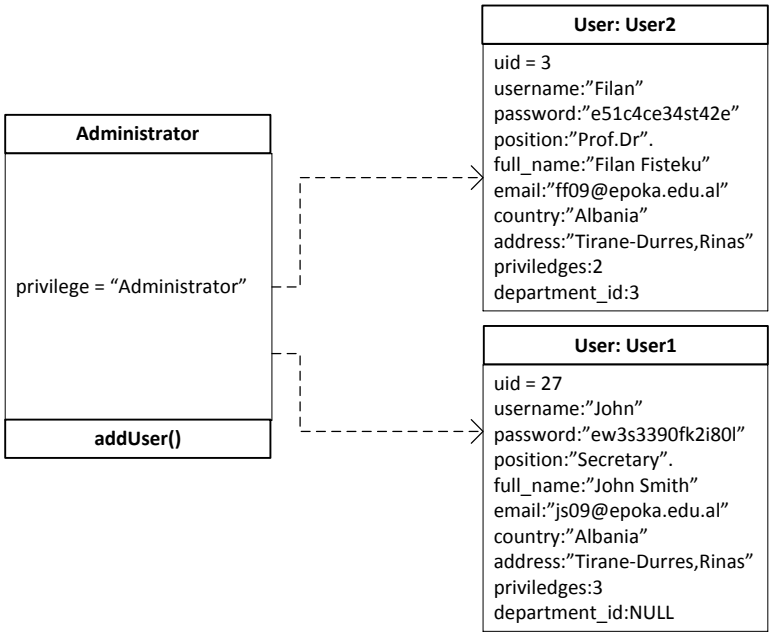


Figure 0.14 - An object Diagram of User Creation