

# **A WEB-BASED AIRLINE RESERVATION SYSTEM**

CASE STUDY: AGEFRECO Airways DRC

By

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## DECLARATION

I MAPATANO BASHENGEZI Erick do hereby declare to the best of my knowledge that this graduation project is my original work and that it has never been submitted to any university or any other institution.

The literature and citations from other people's work have been duly referenced with acknowledgement in the text, footnotes or bibliography.

Signed:



**Mapatano Bashengezi Erick**

Date:

June 1st, 2009

### APPROVAL

The project report titled "A web-based airline reservation system" has been submitted for examination with my approval.

Signature .....  ..... Date ..... 28-05-2009 .....

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## **DEDICATION**

I dedicate this work to my parents BASHENGZI MIRINDI Patrice and KABARUSHA LUBULA Charlotte who financially supported my entire study at Kampala International University and I can not forget the support of all my lovely brothers and sisters.



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## **Abbreviations and acronyms**

- ASP: Active Server Pages
- B2C: Business to Company
- BPR: Business Process Reengineering
- DBMS: Database Management System
- FTP: File Transfer Protocol
- GUI: Graphical User Interface
- HTML: Hypertext Mark up Language
- HTTP: Hypertext Transfer Protocol
- IS: Information System
- IT: Information Technology
- JAD: Joint Application and Design
- MIS: Management Information System
- Php: Hypertext reprocessing
- RDBMS: Relational Database Management System
- URL: Uniform resource Locator
- VB script: Visual Basic Script
- WAIS: Wide Area Information Service
- WWW: world Wide Web
- WYSIWYG: What You See Is What You Get



## **Abstract**

Airline companies have existed since the beginning the 20<sup>th</sup> century. This industry has been dramatically improving since the late 1950s. European and American companies lately developed websites for their companies in order to increase customer satisfaction through these new services. In Africa, especially in DRC, this new technology is still at the initial stage and developers are shifting from simple websites to dynamic ones with much more interactivity.

This paper focuses on the airline industry on the Web and develops a customer-oriented airline site evaluation framework. It may be useful not only to users that purchase airline services via Internet but also to designers and developers of airline websites.

The main objective of this project was not only to develop an online airline reservation system that could speed up the business process of the company but also to allow users to check themselves for flight schedules, tariffs, plane types and they would be able to make and cancel a reservation.

Airline reservation systems can manage multiple airlines, schedules and fares. Multiple agents can log in and users can view deals reserve online and pay with either a credit card, check or cash. The administrators can basically setup the system to your needs, input all the fare into airline schedules and create agents who will use the system to book and make reservations.

It is not envisaged that the tool will entirely change the whole business process of companies. It will supplement the old process by adding more facilities to customers, clerks and the overall management staff of organizations. The findings of this study were generalized so as to cater for more problems and thus help a broader audience

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the study

In today's economy, efficiency and agility of doing business is a key for an organization's survival. The WWW, with its ease of use, and global acceptance even by the relatively computer illiterate makes it an ideal vehicle for doing business not only with individual customers, but also with business partners Chaffey (2002) [1].

While Agefreco Airways has reservation and ticketing points at various convenient locations in most major cities in DRC, complete coverage for presence in every potential customer's city is not economically viable. With each new outlet, staffing requirements and estate rental costs as well, recurring budgets play a major role in decision making.

An online reservation system will facilitate existing customers to easily do business with airline companies over the WWW with increased convenience by avoiding the drive to the nearest ticketing location, avoiding waiting queues at the ticketing location, avoiding the waiting time in a phone call to the call center when a customer calls for information and by doing business whenever it makes sense to the customer (24x7) but not when it makes sense to the airlines.

And this will result in the following:

- A more vibrant and agile Agefreco airways
- Increased customer satisfaction
- Increased customer base without immense staffing or infrastructure requirements Luke (2001) [11].

Currently, customers make their bookings only at pre-selected ticketing locations, and then the company enters registration details into books and put them into computers after sometimes. This delays the business process of the company as it takes time and requires additional staffs.

## **1.2 Statement of the problem**

There is no airline reservation system that can be accessed for online booking by Agefreco airways' customers. The current system is characterized by a ticketing problem. The fact that clerks have to manually check into different papers for the availability of tickets left, the day and date of flight, and view the airline's network of flights and destinations wastes a lot of time. This has resulted into lack of efficiency, speed, and accuracy which hinders customers from achieving their business goals and objectives. Therefore customers are not satisfied with the business process of the company

## **1.3 Objectives of the project**

### **1.3.1 General objectives**

The general objective of the study was to develop a web based system that would speed up the airline reservation system for Agefreco airways.

### **1.3.2 Specific objectives**

1. To identify variables that can be used to develop a web-based airline reservation system.
2. To design a web-based airline reservation system for Agefreco airways
3. To implement a prototype web-based airline reservation system for the company.
4. To test and validate the developed system during the course of study

#### **1.4 Scope of the project**

This study was confined to a B2C (Business to customer) company that registers customers who have to travel to different locations at different times of the day.

Most of the features available for online reservation system were implemented and no additional features were developed. The study involved complete design and implementation of a user friendly to be used by customers of the company as well as its administrators. For security matters, administrative rights were assigned only to some of the employees of the company approved by the company's management, and customers will have to register with the company before making their bookings.

#### **1.5 Significance of the project**

This project can help airline companies experience an increase in their customer base. This includes customers who previously flew with other competitors, as well as those who did not previously fly, but can now afford to do so. As human beings are not always available, this system will let customers make their bookings at any time of their convenience. Furthermore, it will be significant for the following reasons:

1. Opening new ticketing locations can only be done at a limited scale.
2. There will be no more need for increasing staff at existing ticketing locations.
3. Having an online airline reservation system for the customers would enable companies to do business with more people.
4. For the scholars, the study will help computer scientists to focus on the development of a packaged application for airline companies.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter reviews the existing literature relevant to website development tools, with the aim of deriving general principles and specific applications useful to a web site designer. The review is specifically carried out to derive generic principles for website design, as opposed to presenting multiple models based on various learners, content, and outcome variables. It is my view that such a focus can serve as an important function as a starting point and as a foundation during this early phase of research and theory applicable to website instruction and training. Bannen (1997) [12] suggested that "there is also a significant need to describe these website development courses in terms of their over-all instructional design characteristics, rather than defining each course only by the specific content it provides". However, I certainly recognize the fact that no one set of design principles will be satisfactory for all conditions Smith (1997) [3].

From the website development to the database development, let us review the existing literature about this concept of web based database development based on all rules and regulations of each of the development processes.

The work will be divided into separate studies concerning web site development and database management.

#### 2.2 Websites

##### Introduction

According to Luke (2001) [11], a website is an application which allows a client to view information provided by the web designer by entering its URL address in the web browser at the proper location. In other words, it's simply a collection of interlinked web pages. Web pages need not be related. By its very nature, the Web makes it possible to link any number of items.

### 2.2.1 Types of websites

According to Susanna (2004) [19], there are a few million active web sites on the internet today and they can be classified in various categories. Some of the categories are common such as ecommerce web sites and corporate web sites, but there are some special types of web sites which also exist on the internet today:

-Corporate web sites: this is the first step for most companies when they decide to build their home on the internet. Corporate web sites are pretty much like corporate presentation in a web friendly form. They provide information to users about the company and also provide contact information. The corporate web site is useful for companies who are planning to use the web site as a marketing tool.

-Personal web sites: as the name suggests, personal web sites are web sites which belong to individuals and they have their personal profile featured on it along with any thing that they have an active interest in. A personal web site is usually targeted to a person's friends and family and has limited viewer ship. Personal web sites are quite easy to put together and you can even do it yourself with the help of some web sites.

-Flash web sites: Flash as you might already know is one of the leading web technologies which exist today. Flash allows you to make an audio video friendly web site which can act as a great way to advertise a product or a service. Many people relate flash to digital format of television and in a way it is true. Flash web sites tend to be rich with graphics and effects and a well designed flash web site is bound to impress the user and create the desired effect. Flash web sites are deployed by luxury product companies and consumer product companies to create a lasting impression on the users.

-Sales pages: Occasionally you would come across a web site which has just a couple of long pages which has a lot of client comments and information about a product. These sites are actually sales pages or landing pages of products or services which are sold online. E-books and online courses have sales pages which help promote them online and these cannot be clubbed with the conventional types of web sites.

-Ecommerce web sites: More and more corporate web sites are moving towards the ecommerce direction. If you have a product which you can sell online, the idea is that you should. Online sales are increasing at a good pace and many offline retailers are venturing into online modes. Ecommerce web sites are those which allow you to buy something online and complete a transaction by paying for it online as well. Ecommerce web sites require interaction with some third party web sites to be able to provide you this service and can be complicated to create but a good ecommerce web site has the potential to provide an excellent revenue stream for a business.

-Web Apps and intranets: A number of online entities are now turning into web based applications which allow you to perform business critical activities such as have online meetings, transact with world wide customers and even bank online. These web applications or intranet systems are complicated web sites which are supported with elaborate back end systems. Web apps are very useful and are likely to become a common thing on the internet in the very near future.

The above listed types are the common types of web sites and though they might be some specialization within these categories, they more or less cover the entire gamut of web sites which exist today

### **2.2.2 Advantages and disadvantages of using websites**

Among the advantages, Norman (2001) [10] said that the information is available to be accessed by anyone, anywhere, anytime. the information within a site can be quickly accessed so there is no need to sift through several pages, the site may provide links to other sites on the same topic, the site can be updated to always provide the latest information, the site creator/author doesn't need to be present when someone is retrieving information, the author can usually be contacted through an emailing address or a message board connected to the site, there is no need to carry a hard copy of information with you (No heavy book), you can look at more than one page or source at the one time by having numerous windows, information is easy to gather and print selectively, easy to use the information to create your own resource, and you can peruse the information at leisure taking as much time as needed.

However, according to Hughes (2003) [22], although many advantages, a website has the following disadvantages: it may be difficult for researchers to locate, especially if there are many similar sites, because it is not “published” or authorized by a reputable source, the site may be disregarded as inaccurate, the information on the site may not be reliable, information may be interpreted incorrectly or used inappropriately, a connection to the web is needed to access the information, which will be impossible if a computer and connection is not available, it may be difficult to reach your target audience, because the author is not present when others are retrieving information there is no opportunity to ask questions or have things explained in greater detail, the site may go down or the computer may crash, and lastly a site may be difficult to use if experience with the internet is limited.

### **2.2.3. Website styles**

Hughes (2003) [22] provided a clear difference between a static and a dynamic website. He said that:

-A static website is one that has web pages stored on the server in the same form as the user will view them. They are edited using three broad categories of software:

- Text editors such as Notepad or text edit, where the HTML is manipulated directly within the editor program.
- WYSIWYG editors such as Microsoft FrontPage and Adobe Dreamweaver (previously Macromedia Dreamweaver), where the site is edited using a GUI interface and the underlying HTML is generated automatically by the editor software.
- Template-based editors, such as rapidWeaver and iWeb, which allow users to quickly create and upload websites to web server without having to know anything about HTML, as they just pick a suitable template from a palette and add pictures and text to it in a DTP-like fashion without ever having to see any HTML code.

-A dynamic website is one that has frequently changing information or collates information on the hop each time a page is requested. For example, it would call various bits of information from a database and put them together in a pre-defined format to present the reader with a coherent page. It interacts



with the users in a variety of ways including by reading cookies recognizing users' previous history, session variables, server side variables etc, or by using direct information (form elements, mouseovers, etc.). A site can display the current state of a dialogue between users, monitor a changing situation, or provide information in some way personalized to the requirements of the individual user.

But according to me, websites are collection of interlinked documents which can't perform all alone without the existence of the elements defined below:

- i. Webpage

In creating web documents, the best way to start is with the web page, the visual part of a much larger system that people most often associate with the World Wide Web. The term "page" refers to nothing more than a World Wide Web document. A web page is much more like a word processing document than a printed page, especially the way it is viewed. And more over, a web page is a document, typically written in Html that is almost always accessible via HTTP, a protocol that transfers information from the Web server to display in the user's Web browser Robert (2001) [16]. When the information on a web page is not visible, you scroll either vertically or horizontally to see more. Figure 1 below illustrates a web page.

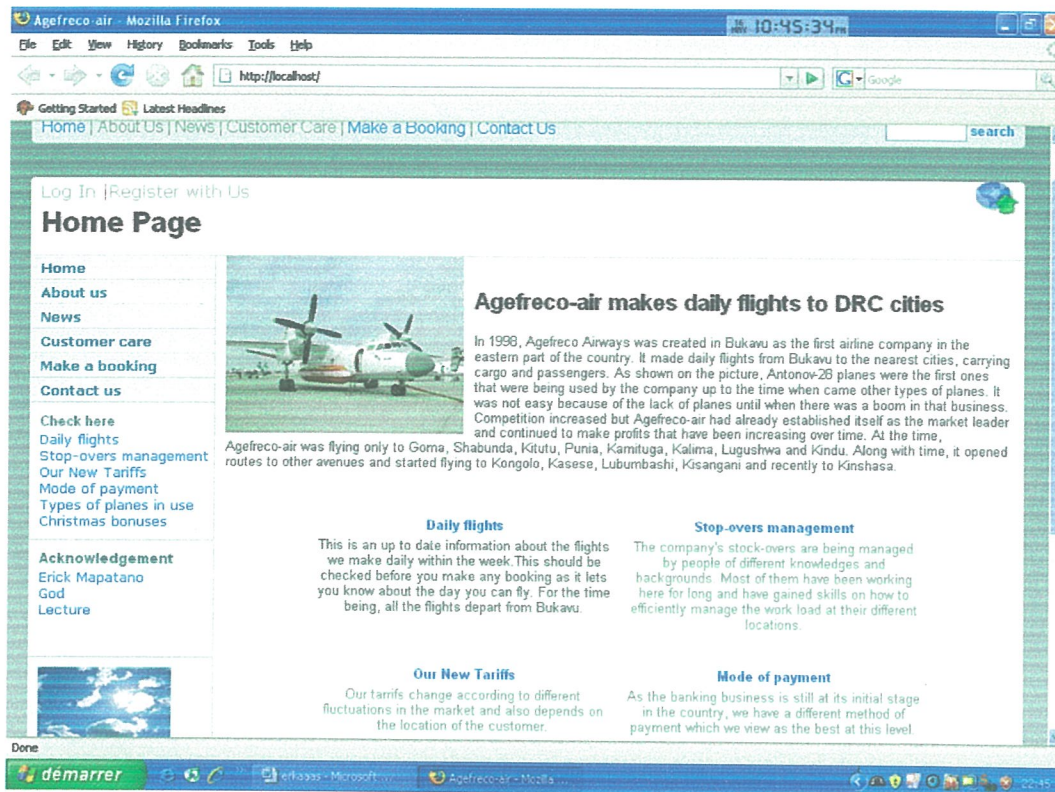


Fig1: Example of a web page

## ii. Home pages

Each site has a home page, the official access point into the site. From the home page, you can get an overview of the site and begin exploring it. A properly designed homepage is, in essence, like a hospitable host. It invites you in and tells you about all the things you can see and do during your visit. It is the most important page of any site, the starting point for your journey Chaffey (2002) [1]

## iii. Web server

This is the linking mechanism between you and the web, between people and pages.

A large company may have its own server, but usually individuals and small company rent or lease space on the server provided by an Internet access company. I can therefore agree that without servers there would be no web. Web pages must reside somewhere on the Internet in order to be accessed with a browser and a server is where you will find them Chaffey (2002) [1]

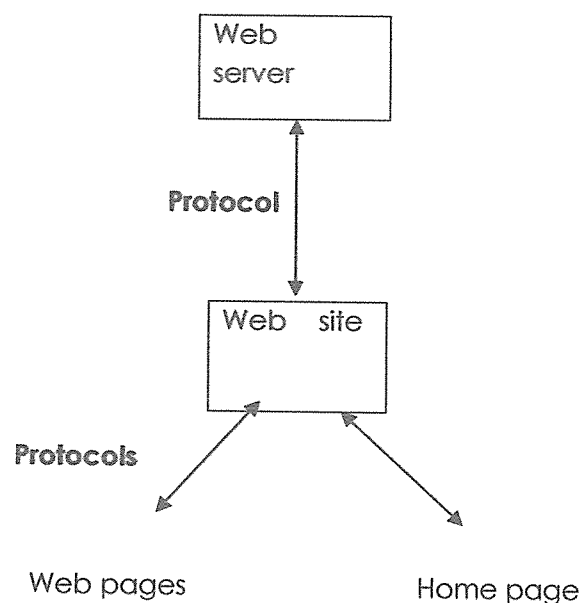
#### iv. Protocols

Again, Chaffey (2002) [1] added that protocols are set of rules or standards designed to enable computers to connect with one another and to exchange information with as little error as possible. The main protocol for transferring information on the web is the Hypertext Transfer Protocol or HTTP. Web pages, both text and graphics are sent from the server to the browser using this protocol.

The web also supports most of the other popular Internet Protocol, such as FTP (File Transfer protocol), Gopher, News and Wide Area Information Service (WAIS). But we don't need to remember all these protocols because the browser does all the work, dynamically switching between protocols as needed.

Looking at the graphic below, you can see how these 5 elements interrelate while developing a web site.

Fig2: Website elements



### 2.3 Databases

These are collections of stored, integrated records that can be maintained and manipulated with great flexibility. They are also defined as shared collections of logically related data designed to meet the information needs of organizations. Microsoft (2002) [24].

### 2.3.1 Database approach

According to CHAFFEY (2002) [1] the DB approach rose because of two main reasons

- Definition of data was embedded in application programs, rather than being stored separately and independently.
- No control over access and manipulation of data beyond that imposed by application programs.

The result was then the Database Management system (DBMS)

### 2.3.2 Application of Databases

Databases are used in many applications, spanning virtually the entire range of computer software. Databases are the preferred method of storage for large multi user applications, where coordination between many users is needed. Even individual users find them convenient, though; many electronic mail programs and personal organizers are based on standard database technology. There are a number of different ways of organizing a schema, that is, of modeling the database structure: these are known as *database models* (or *data models*). According to The UK Web Design Company (UKWDC), a data model is a "description" of both a container for data and a methodology for storing and retrieving data from that container. The model in most common use today is the *relational model* which represents all information in the form of multiple related tables each consisting of rows and columns (the true definition uses mathematical terminology). This model represents relationships by the use of values common to more than one table.

Other models such as the *hierarchical model* and *network model* use a more explicit representation of relationships MELONI (2004) [2]:

*\*Hierarchical model:* As its name implies, the Hierarchical Database Model defines hierarchically-arranged data. Relationships in such a system are thought of in terms of children and parents such that a child may only have one parent but a parent can have multiple children. Parents and children are tied together by links called "pointers" (perhaps physical addresses inside the file system). A parent will have a list of pointers to each of their children.

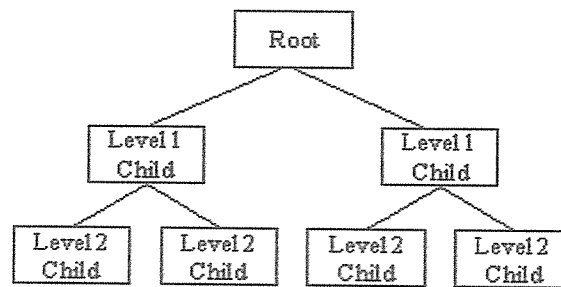


Fig 3: Parent-children relation

This child/parent rule assures that data is systematically accessible. To get to a low-level table, you start at the root and work your way down through the tree until you reach your target. Of course, as you might imagine, one problem with this system is that the user must know how the tree is structured in order to find anything

*\*Network model:* the Network Database model was designed to solve some of the more serious problems with the Hierarchical Database Model. Specifically, the Network model solves the problem of data redundancy by representing relationships in terms of sets rather than hierarchy. The model had its origins in the Conference on Data Systems Languages (CODASYL) which had created the Data Base Task Group to explore and design a method to replace the hierarchical model. Visually, a Network Database looks like a hierarchical Database in that you can see it as a type of tree. However, in the case of a Network Database, the look is more like several trees which share branches. Thus, children can have multiple parents and parents can have multiple children.

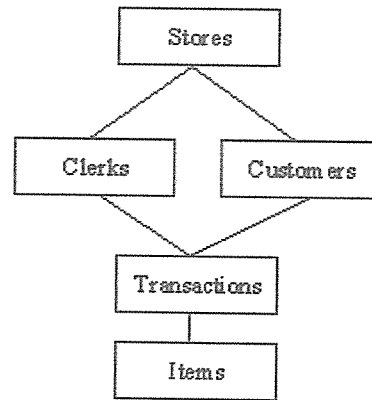


Fig 4: Network model

Nevertheless, David (2000) [4] thought that it was a dramatic improvement; the network model was far from perfect. Most profoundly, the model was difficult to implement and maintain. Most implementations of the network model were used by computer programmers rather than real users. What was needed was a simple model which could be used by real end users to solve real problems

### 2.3.3 Database Management System

This refers to comprehensive software tool that allows users to create, manipulate and maintain integrate base of data to produce relevant information. David (2000) [4] defines a database as a tool that users, managers and database professionals in the information systems organization must use if data are to be readily accessible to all who need to know.

Although it might be evident that these databases will need to be connected to the developed web sites, this will be done through the use of special software systems. We use current and proven technologies and languages like Active Server Pages (ASP classic), ASP.NET, Cold fusion, Java Script, PHP, VBScript or Java Applets for connection.

Although not much better according to many authors, I found a good interest in the use of PHP application which I found more user-friendly than others MELONI (2004) [2].

### Advantages of a DBMS

According to David (2000) [4], they include:

- Control of data dependency by integrating the files so that several copies of the same data are not stored.
- Data consistency: This is the elimination or control of redundancy which reduces the risk of inconsistency.
- Improved data accessibility and responsiveness: As a result of integration, data that crosses departmental boundaries is directly accessible to end users. This provides a system with potentially much more functionality.
- Increased productivity: The DBMS provides many of the standard functions that the programmer would normally have to write in a file based application. DBMS provides all low-level file-handling routines that are typically in application programs.
- Increased concurrency: Many DBMS manage concurrent DB access and ensure that if two or more users are allowed to access the same file simultaneously, it is not possible that the accesses will interfere with each other.
- improved back-up and recovery services: many file-based systems place the responsibility on the user to provide measures to protect the data from the failures to the computer system or application program.

### Disadvantages of a DBMS

According to David (2000) [4], the disadvantages of a DBMS include the following: complexity reduces performance, size makes it slow performing tasks, high cost of DBMS, additional hardware costs, cost of conversion, and higher impact of failure.

## **2.4 Airline companies**

An airline provides air transport services for passengers or freight, generally with a recognized operating certificate or license. Airlines lease or own their aircraft with which to supply these services and may form partnerships or alliances with other airlines for mutual benefit.

Airlines vary from those with a single airplane carrying mail or cargo, through full-service international airlines operating many hundreds of airplanes. Airline services can be categorized as being intercontinental, continental, or domestic and may be operated as scheduled services or charters.

### **Brief history of airlines**

DELAG, *Deutsche Luftschiffahrts-Aktiengesellschaft* (German: acronym for "German Airship Transport Corporation") was the world's first airline. It was founded on November 16, 1909 with government assistance, and operated airships manufactured by Zeppelin Corporation. Its headquarters were in Frankfurt. (Note: Americans, such as Rufus Porter and Frederick Marriott, attempted to start airlines in the mid-19th century, focusing on the New York-California route. Those attempts foundered due to such mishaps as the aircraft catching fire and the aircraft being ripped apart by spectators.) The five oldest non-dirigible airlines that still exist are Australia's Qantas, Netherland's KLM, Colombia's Avianca, Czech Republic's Czech Airlines and Mexico's Mexicana. KLM first flew in May 1920 while Qantas (for the Queensland and Northern Territory Aerial Services Limited) was founded in Queensland, Australia in late 1920.

In USA and Europe, the airline companies were borne since the 1910s-1920s.

In USA, the first airline was started by Tony Janus who conducted the United States' scheduled commercial airline flight on 1 January 1914 for the Saint Petersburg-routes.

Passenger service during the early 1920s was sporadic: most airlines at the time were focused on carrying bags of mail. In 1925, however, the Ford Motor Company bought out the Stout Aircraft Company and began construction of the all-metal Ford Trimotor, which became the first successful American airliner. With a 12-passenger capacity, the Trimotor made passenger service potentially profitable. Air service was seen as a supplement to rail service in the American transportation network.



In Europe, the first countries to embrace air transport were Finland, France, Germany, the Netherlands and the United Kingdom.

KLM, the oldest carrier still operating under its original name, was founded in 1919. The first flight (operated on behalf of KLM by Aircraft Transport and Travel) transported two English passengers to Schiphol, Amsterdam from London in 1920. Like other major European airlines of the time (see France and the UK below), KLM's early growth depended heavily on the needs to service links with far-flung colonial possessions (Dutch Indies).

In Asia, Some of the first countries in Asia to embrace air transport were India, Hong Kong, Indonesia, Malaysia, Pakistan and the Philippines .

One of the first countries in Asia to embrace air transport was the Philippines. Philippine Airlines was founded on February 26, 1941, making it Asia's oldest carrier and the oldest operating under its current name.

However International regulations provided by groups such as the International Civil Aviation Organization establish worldwide standards for safety and other vital concerns. Most international air traffic is regulated by bilateral agreements between countries, which designate specific carriers to operate on specific routes. The model of such an agreement was the Bermuda Agreement between the US and UK following World War II, which designated airports to be used for transatlantic flights and gave each government the authority to nominate carriers to operate routes. In the 1990s, "open skies" agreements became more common. These agreements take many of these regulatory powers from state governments and open up international routes to further competition. Open skies agreements have met some criticism, particularly within the European Union, whose airlines would be at a comparative disadvantage with the United States' because of cabotage restrictions.

Most of the best airline companies in the world are in America and over the 50 years, U.S. airlines have experienced more turbulence than almost any other country or region.

Some of the successful airline companies today include British Airways, Lufthansa, American Airlines, KLM, Kenya Airways, etc. Wikipedia (2009) [23]

## **2.5 Website development tools**

### **2.5.1. Adobe Dreamweaver**

Adobe Dreamweaver (formerly Macromedia Dreamweaver) is a web development application originally created by Macromedia, and is now developed by Adobe Systems, which acquired Macromedia in 2005.

Dreamweaver is available for both Mac and Windows operating systems. Recent versions have incorporated support for web technologies such as CSS, JavaScript, and various server-side scripting languages and frameworks including ASP, ColdFusion, and PHP.

Although a hybrid WYSIWYG and code-based web design and development application, Dreamweaver's WYSIWYG mode can hide the HTML code details of pages from the user, making it possible for non-coders to create web pages and sites. One criticism of this approach is that it has the potential to produce HTML pages whose file size and amount of HTML code is larger than an optimally hand-coded page would be, which can cause web browsers to perform poorly. Dreamweaver 8.0 performed poorly on the Acid2 Test, developed by the Web Standards Project. However, Adobe has focused on support for standards-based layout in recent and current versions of the application, including the ability to convert tables to layers.

Dreamweaver allows users to preview websites in locally-installed web browsers. It also has site management tools, such as FTP/SFTP and WebDAV file transfer and synchronization features, the ability to find and replace lines of text or code by search terms and regular expressions across the entire site, and a templating feature that allows single-source update of shared code and layout across entire sites without server-side includes or scripting. The behaviours panel also enables use of basic JavaScript without any coding knowledge, and integration with Adobe's Spry AJAX framework offers easy access to dynamically-generated content and interfaces.

Dreamweaver can utilize third-party "Extensions" to enable and extend core functionality of the application, which any web developer can write (largely in HTML and JavaScript). Dreamweaver is supported by a large community of extension developers who make extensions available (both commercial and free) for most web development tasks from simple rollover effects to full-featured shopping carts.

Like other HTML editors, Dreamweaver edits files locally, then uploads all edited files to the remote web server using FTP, SFTP, or WebDAV. Dreamweaver CS4 now supports the Subversion (SVN) version control system Wikipedia (2009) [23].

### **2.5.2. PHP (Hypertext Preprocessor)**

PHP is a scripting language originally designed for producing dynamic web pages. It has evolved to include a command line interface capability and can be used in standalone graphical applications.

While PHP was originally created by Rasmus Lerdorf in 1995, the main implementation of PHP is now produced by The PHP Group and serves as the de facto standard for PHP as there is no formal specification. PHP is free software released under the PHP License, however it is incompatible with the GNU General Public License (GPL), due to restrictions on the usage of the term PHP.

PHP is a widely-used general-purpose scripting language that is especially suited for web development and can be embedded into HTML. It generally runs on a web server, taking PHP code as its input and creating web pages as output. It can be deployed on most web servers and on almost every operating system and platform free of charge. PHP is installed on more than 20 million websites and 1 million web servers.

Originally designed to create dynamic web pages, PHP's principal focus is server-side scripting, and it is similar to other server-side scripting languages that provide dynamic content from a web server to a client, such as Microsoft's Active Server Pages, Sun Microsystems' JavaServer Pages, and mod\_perl. PHP has also attracted the development of many frameworks that provide building blocks and a design structure to promote rapid application development (RAD). Some of these include

CakePHP, Symfony, CodeIgniter, and Zend Framework, offering features similar to other web application frameworks Wikipedia (2009) [23].

### 2.5.3. MySQL

MySQL is a relational database management system (RDBMS) which has more than 6 million installations. The program runs as a server providing multi-user access to a number of databases.

MySQL is owned and sponsored by a single for-profit firm, the Swedish company MySQL AB, now a subsidiary of Sun Microsystems, which holds the copyright to most of the code base.

The name "MySQL" is officially pronounced /maɪˌɛskjuːl/ (My S Q L), not "My sequel" /maɪˈsiːkwəl/. This adheres to the official ANSI pronunciation; SEQUEL was an earlier IBM database language, a predecessor to the SQL language. However, the developers do not take issue with the pronunciation "My Sequel" or other local variations Jay (2001) [21].

MySQL works on many different system platforms, including, Linux, Ubuntu, Mac OS X, NetBSD, Novell NetWare, SunOS and Microsoft Windows.

Libraries for accessing MySQL databases are available in all major programming languages. In addition, an ODBC interface called MyODBC allows additional programming languages that support the ODBC interface to communicate with a MySQL database, such as ASP or ColdFusion

To administer MySQL databases one can use the included command-line tool (commands: mysql and mysqladmin) or the GUI tools with WampServer for example.

However, MySQL recently (2008) released version 5.1 which has many crashes and bugs. It shows poor performance when used for data warehousing

And MySQL does not offer a single table type ("storage engine") offering all features; the two most common types, MyISAM and InnoDB, do not completely overlap in their feature sets Jay (2001) [21].

## 2.6 Conclusion

A number of themes emerge from an examination of the existing literature which is relevant to instructional database web site design. Through the understanding of the principles delineated above, and careful and thoughtful planning, there is no reason that instructional web designer can not create a learning environment in the world of web sites as effective as any that can be created at a specific physical training site James (2001) [13]. According to me, not only these principles will ensure the development of a competitive website, but the designer should also make use of the vast resources available on the Internet to enrich the basic instructional materials. This will help create a very interactive website which will attract customers.

The database generates the information displayed on the websites, which provide users with the facility to retrieve or the deposit structured information sets. Storing the desired information in a database or accessing existing database reduces development costs. Web pages are generated dynamically using the designed templates and data from the database. By combining a database with a Web site, we can develop highly sophisticated and dynamic Websites which will help these airline companies achieve the best from themselves. From America to Asia via Europe, airline companies have emerged with time and this increase in their number has facilitated the transport of people and cargo from places to others as well from countries to others all over the world.

## **CHAPTER 3**

### **METHODOLOGY**

#### **Introduction**

The SDLC recognized as system development life cycle is one of the most appropriate methods used in developing systems. SDLC relates to the process of developing systems, and the models and methodologies that people use to develop these systems, generally computer or information systems.

The feasibility study showed that it was viable to implement a new system and therefore we can go on with the analysis of the current system of Agefreco Airways.

#### **3.1 System analysis**

After evaluating the feasibility of the project, it was seen that it was viable, and therefore I could start the analysis phase where the causes and effects of the problem under study were analyzed. Data were gathered using various methods of gathering them and finally analyzed using data flow diagrams. This phase describes what a system should do to satisfy the needs of its users.

##### **3.1.1 Data collection techniques**

The data collection techniques targeted senior, middle and lower managers of Agefreco Airways. These gave complete and concrete information to determine requirements for the system under investigation. Other information came from customers of the company.

I used purposeful sampling techniques to choose respondents who are able to give reliable and accurate information due to their position of authority and expertise. From senior managers to operational staff through middle managers, each class of managers was able to provide relevant information as expected from them.

Various techniques of data collection were used. They included the traditional approach (interviews, questionnaires and observation). Throughout the process

of gathering data, emphasis was given to confidentiality as a top priority in order to elicit the support and co-operation of the respondents.

### *1. Interviews*

I asked important questions to Agefreco Airways employees and merely all of them were answered to. Refer to Appendix A to find out these questions

Among the advantages that I found using interviews to collect data, I can say that they helped me gather information directly from users because some of the workers were illiterate and could not write down their ideas appropriately, and they helped me feel as if I am part of the system by getting live information from respondents eliminating areas of misunderstanding.

Although these advantages, I could find in some disadvantages. The biggest disadvantage is that they were time consuming. Apart from that, they were prone to misinterpretation because of respondents using jargons, and at times, some senior managers could not be accessed to as they were busy doing their works.

### *2. Questionnaires*

They allowed me to collect data from a large number of users when most of them were busy. These questions are in appendix B.

-Responses looked to be honest as the respondents were anonymous.

-I sent them to a large number of respondents as it was just a matter of writing down.

-Responses came very fast and easily answered.

-Not all expected respondents sent back their questionnaires.

-They took me much time to develop.

-They did not allow me to observe the expression and reactions of respondents while answering.

### 3. Observation

This allowed me to obtain first hand information that I could not obtain using the other techniques. It allowed me to get information on how work was being carried on the field.

-Interruptions resulting from the inefficiencies of the current system were observed.

-it allowed me to take note of every single action that was felt to be unnecessary in the performance of the work

-It took me time to observe workers as they were performing their tasks.

-People tended to behave differently until when I impersonated myself to be a worker of Agefreco Airways for 2 days.

### 3.2 Data flow diagram

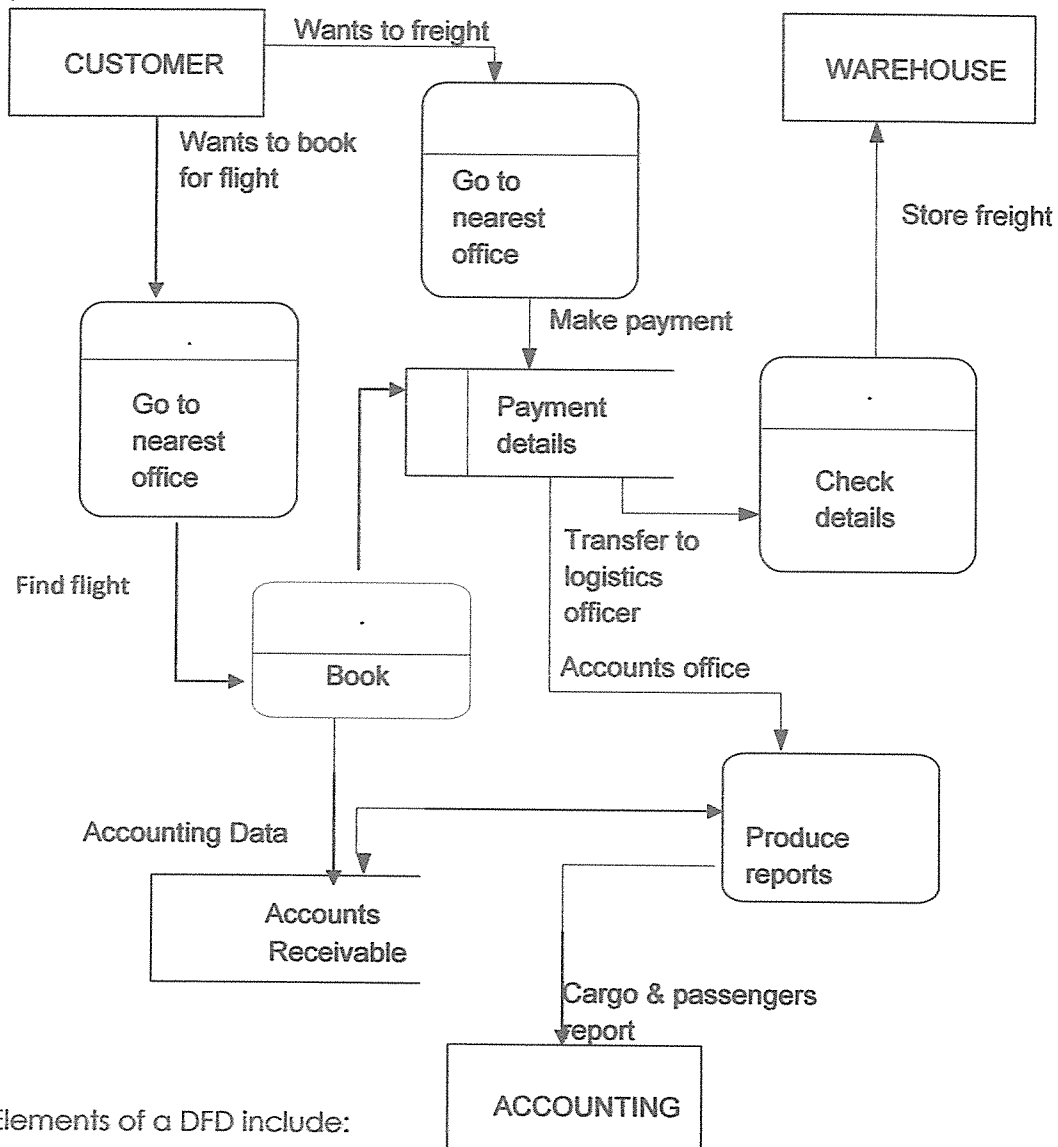
Data flow diagrams (DFD) are used to describe how the system transforms information. They define how information is processed and stored and identify how the information flows through the processes. They are graphical representations of the "flow" of data through an information system



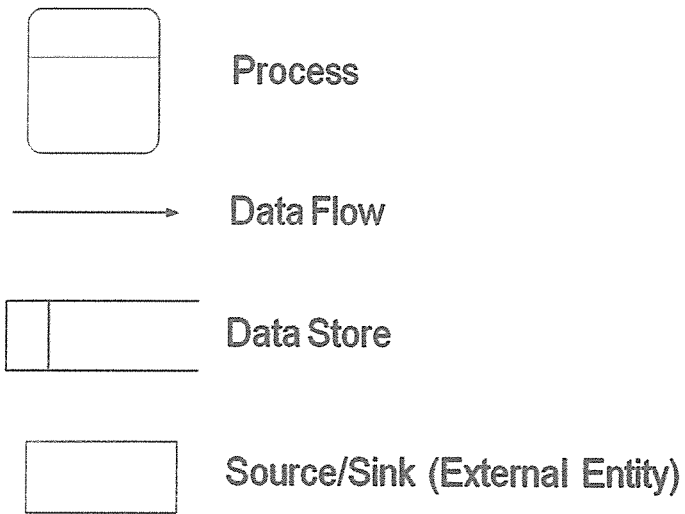
# Data flow diagram for the old system

Fig 5; DfD old

system



Elements of a DFD include:



This old system involves a lot of paper work. After information has been written on paper using the pen, it is then taken to the shelves for storage.

### 3.3 Requirements

Requirements represent a specification for the new system. We usually distinguish between functional requirements which specifies what the system must do or the processing which the system will be required to carry out and non functional requirements which describe the aspects of the system that are concerned with how well it provides the functional requirements.

#### 3.3.1 Functional requirements

These are details of the inputs into the system as well as its output. Our website will be able to receive data through its different forms and as well a reservation form will be made available and an acknowledge page will be displayed to the customer if the reservation is successful as the output of the system. The illustration here below represents the reservation page of our website.

booking - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost/book.php

Getting Started Latest Headlines


1. Flight:

2. CustomerID:

3. Cancel: ☐ YES ☐ NO

4. Otherpref:

AGEFRECO-AIR

 [About Us](#) | [Site Map](#) | [Privacy Policy](#) | [Contact Us](#) | ©2009 Agefreco-air

Done

démarrer

url:aaas-Micros... .net

Système D'explo...

booking - Mozilla...

localhost / localh...

0015

Fig 7: Reservation page

### 3.3.2 Non functional requirements

These are quality requirements and include performance criteria such as desired response times for updating data in the system or retrieving data from the system, security considerations, standards the working system should meet usability requirements, etc. The illustration below shows how well security is implemented in the website.

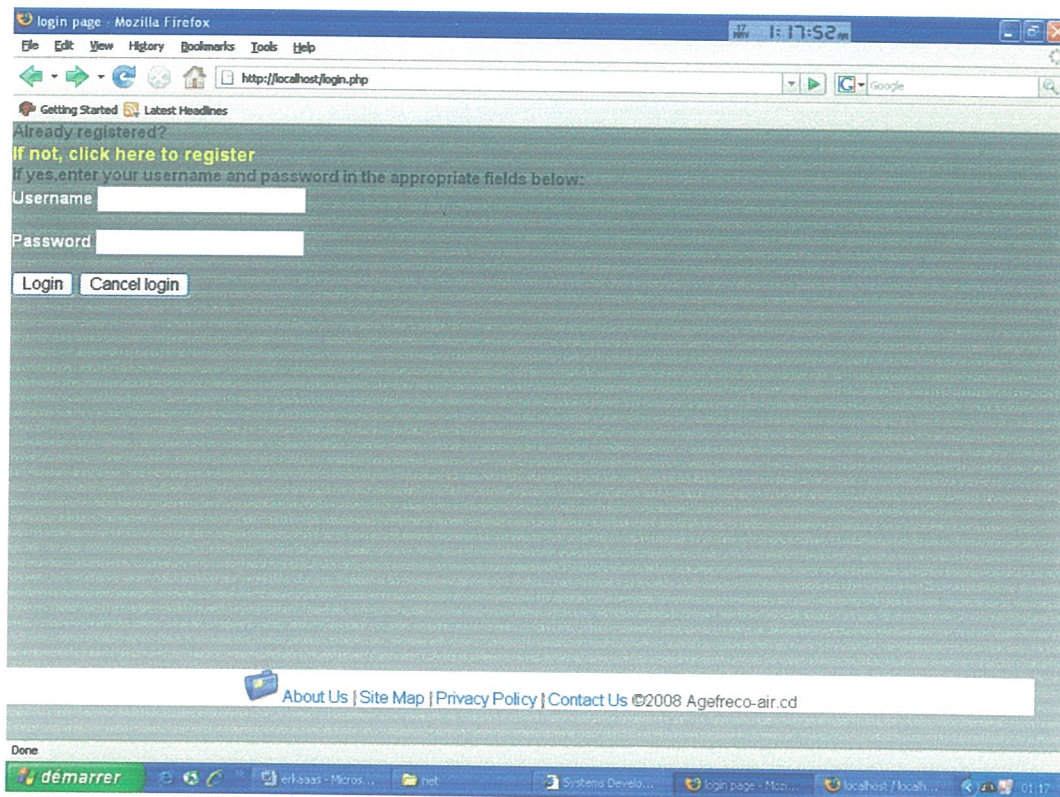


Fig 7: Security

### 3.4 Conclusion

Systems Development Life Cycle (SDLC) is any logical process used by a systems analyst to develop an information system, including requirements, validation, training, and user ownership.

Through different data finding techniques, I came to know where the problem with this airline company was and I drew a data flow diagram of their old system after I have made a feasibility analysis of the company.

## CHAPTER 4

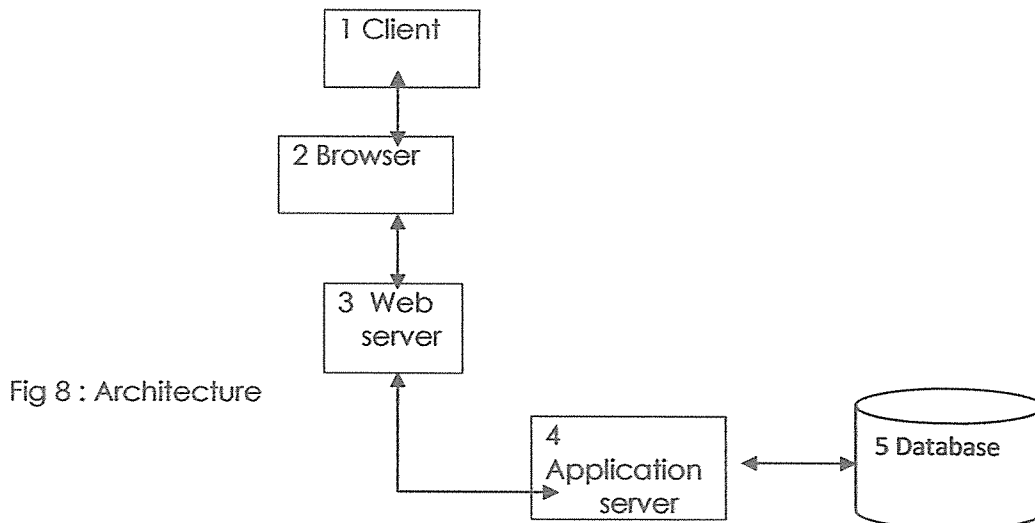
### SYSTEM DESIGN

#### 4.1 Introduction

Systems design is the process or art of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. One could see it as the application of systems theory to product development. This phase follows the analysis phase and produces design specifications of the new system. It is categorized into 2 sections: logical and physical design.

#### 4.2 Conceptual design

Customers should be able to view all details of available flights with all destinations and stopovers, book for their appropriate ones, and buy tickets online. All these processes will be made possible by means of integrated computer knowledge. A client-server architecture model will be implemented so as to produce the necessary output possible.



### *1. Client:*

This is a person who uses the web site to access the new features of the company such as the online reservation.

### *2. Browser:*

The browser or web browser is the computer application which allows users to view web pages, read their contents, complete and submit forms online. Through the browser, the user issues an HTTP request which is addressed to the web server and view the returned page from the server.

### *3. Web server:*

The web server receives the request for this web page, retrieves its file, and passes it to the application server for processing. It processes scripts and sends the resulting HTML page to the client browser that requested it. The web server that we will be using is the Apache. It provides all the services required for web page processing.

### *4. Application server:*

This is a software utility that uses web servers to generate information from databases. We will generate server-side scripting. This will be done by using WAMP SERVER software. At this level, there will be the need for the server to access relational databases as for information request.

## **4.3 logical design**

This is concerned with what is required. It defines all the inputs to the systems, the outputs to be produced by the system, the processes that must be performed and the constraints to be met.

#### 4.4 Physical design

It deals with how the requirements are satisfied. It describes how the data is input, how it is stored and processed, how the output is produced, and how the constraints are met. It transforms the logical design material into real computer work by designing the input/output processes and to decide how logical structure is to be physically implemented (as relations) in the target database management systems.

The following are the data stores which are the back end of the information system. They are tables:

**Table1: Administrator login table**

Field	Type	Collation	Attributes	Null
<u>Username</u>	varchar(12)	ascii_general_ci		No
<u>Password</u>	varchar(12)	ascii_general_ci		No

**Table 2: Booking table**

Field	Type	Collation	Null
<u>Book ID</u>	int(11)	ascii_general_ci	No
<u>Customer ID</u>	int(11)	ascii_general_ci	No
<u>Other Preferences</u>	Varchar(300)	ascii_general_ci	No
<u>Flight</u>	Enum	ascii_general_ci	No
<u>Flight Label</u>	Set	ascii_general_ci	No
<u>Cancel</u>	Enum	ascii_general_ci	No

**Table 3: Days table**

Field	Type	Collation	Null
<u>Day ID</u>	int(3)	ascii_general_ci	No
<u>Monday</u>	Text	ascii_general_ci	No
<u>Tuesday</u>	Text	ascii_general_ci	No
<u>Wednesday</u>	Text	ascii_general_ci	No
<u>Thursday</u>	Text	ascii_general_ci	No
<u>Friday</u>	Text	ascii_general_ci	No

Field	Type	Collation	Null
Saturday	Text	ascii_general_ci	No
Sunday	Text	ascii_general_ci	No

Table 4: Flights

Field	Type	Collation	Null
Flight	int(3)	ascii_general_ci	No
Flight number	Text	ascii_general_ci	No
Departure	Text	ascii_general_ci	No
Arrival	Text	ascii_general_ci	No
Plane type	Text	ascii_general_ci	No
Price/Kg	Text	ascii_general_ci	No
Price/Passenger	Text	ascii_general_ci	No

Table 5: Users/registration

Field	Type	Collation	Null
User ID	int(11)	utf8_general_ci	No
First name	Varchar(256)	utf8_general_ci	No
Last name	Varchar(256)	utf8_general_ci	No
Username	Varchar(256)	utf8_general_ci	No
Password	Varchar(256)	ascii_general_ci	No
Town	Varchar(20)	ascii_general_ci	No
Phone	Bigint (255)	ascii_general_ci	No
Birth date	Text	ascii_general_ci	No
E-mail	Varchar(256)	utf8_general_ci	No
Gender	Enum	utf8_general_ci	No



#### 4.5 Data flow diagram for the new system

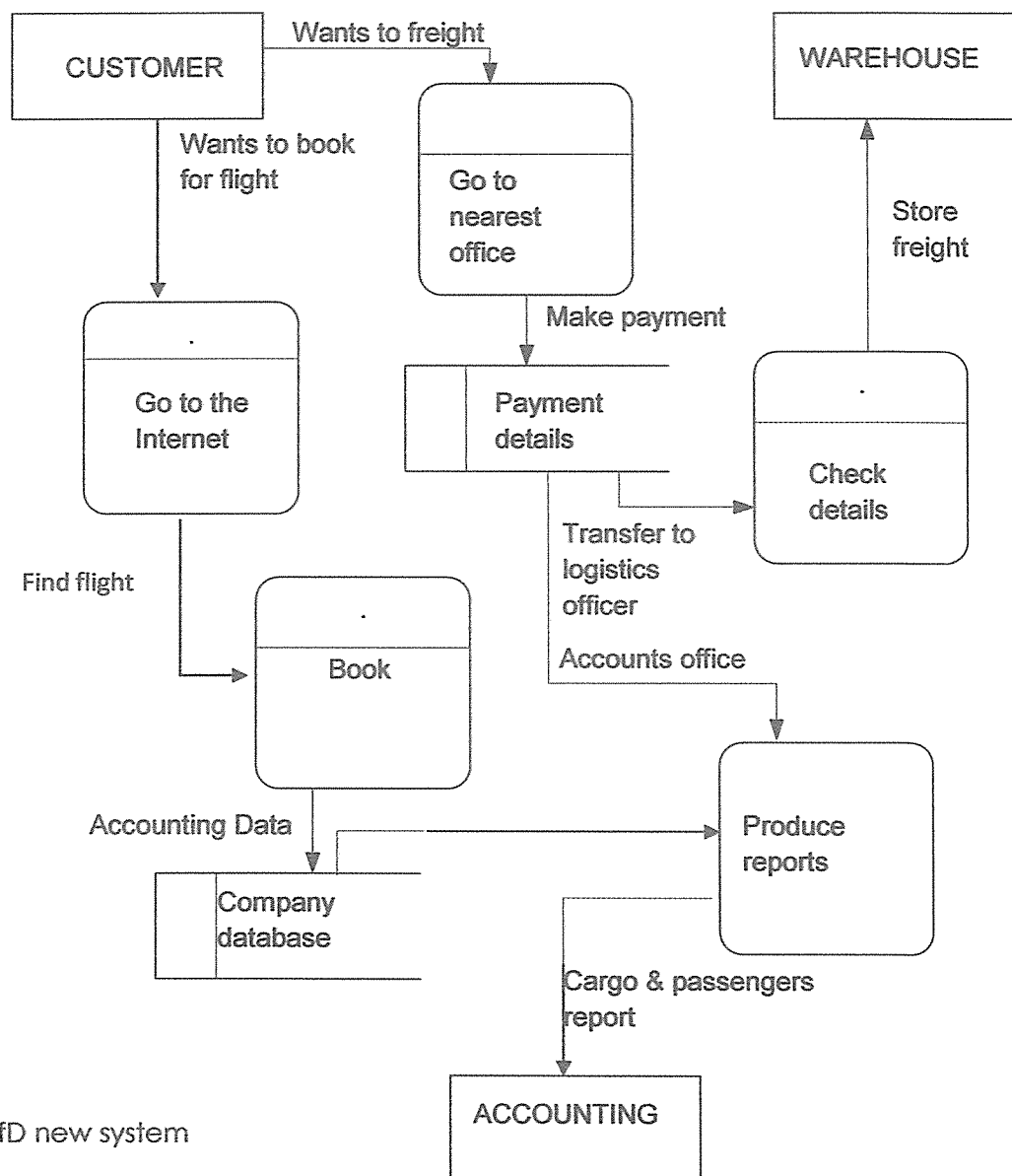


Fig 9: DfD new system

The new system is computerized. Customers can book via the internet or go to the nearest office in case they want to freight up cargo. For booking, you can either go to the internet, or as well go to a nearest office. The system facilitates the business process as all booking details are kept electronically and can easily be retrieved when needed.

## 4.6 The system flow chart

A flowchart is common type of chart, which represents an algorithm or process, showing the steps as boxes of various kinds, and their order by connecting these with arrows. In other words, a system flow chart is a diagrammatic representation of all the processes of a system. It shows how data is captured, processed and then output.

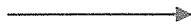
Some of the symbols used in flow charts include:

### 1. Start and end symbols



Usually containing the word "Start" or "End", or another phrase signaling the start or end of a process, such as "submit enquiry" or "receive product".

### 2. Arrows



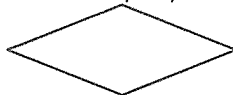
An arrow coming from one symbol and ending at another symbol represents that control passes to the symbol the arrow points to

### 3. Data processing (Input/Output)



Represented as parallelogram, they describe the action that is going to take place. Examples: Get X from the user; display X.

### 4. Condition or decision

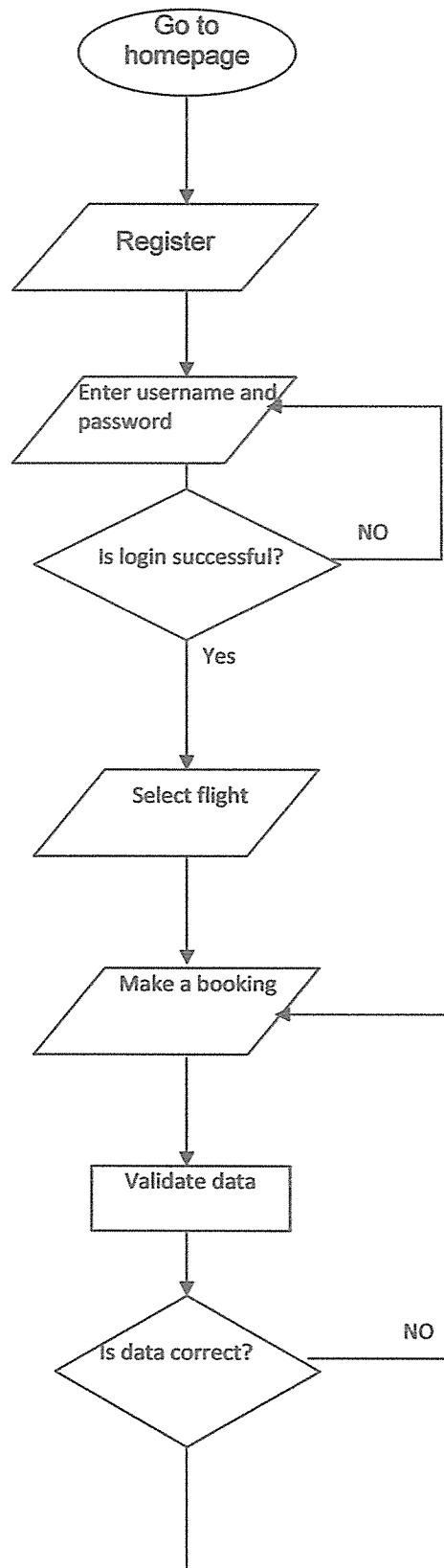


Represented as a diamond (rhombus). These typically contain a Yes/No question or True/False test. This symbol is unique in that it has two arrows coming out of it, usually from the bottom point and right point, one corresponding to Yes or True, and one corresponding to No or False. The arrows should always be labeled.

### 5. Data storage



These are mainly databases in which data are kept.

Flow chart for the new system

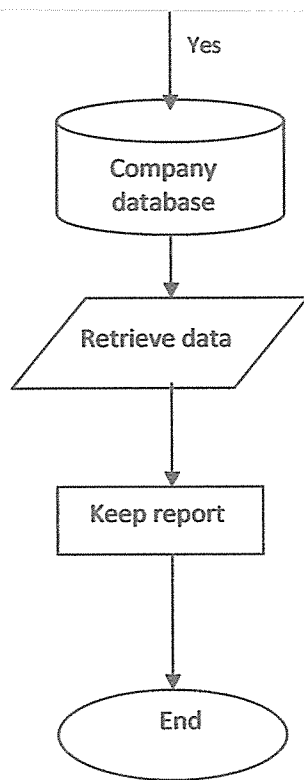


Fig 10: Flow chart new system

## CHAPTER 5

### SYSTEM TESTING, IMPLEMENTATION AND EVALUATION

#### Introduction

Having finished the system design, I went on to system testing, implementation and evaluation in which I did an overview of the entire system. It combines all concepts that led to the development of the program code.

#### 5.1 System testing

Agefreco airways website was 1<sup>st</sup> used experimentally to ensure that the system does not fail. To make sure of that, special test data was used for processing and the results were successful.

Data was input into the website using the computer keyboard. A customer was supposed to feed in data into the appropriate fields and see whether anything would be wrong. But fortunately, there was no error at that level.

The data processing was done in different ways; it consisted of editing the already existing data in the database, updating the stored data, retrieving the data from the database, registering new customers, logging in using new username and passwords, etc.

All data entered by the customer were to be saved in the database so as to be retrieved later by the authorized people in the company database

The output was done depending on what data the company members wanted to see. It consisted of checking details in all the preferred tables of the company and generating reports using SQL queries

#### 5.2 System implementation

After the approval of the system tests, me and the managers of the company agreed on the implementation of the system.

### 5.2.1 Approach

Parallel implementation was done which allowed both the old and the new system to run concurrently until total approval of the new system.

The benefit of this approach was, if the new system failed to work, the organization would stop its use.

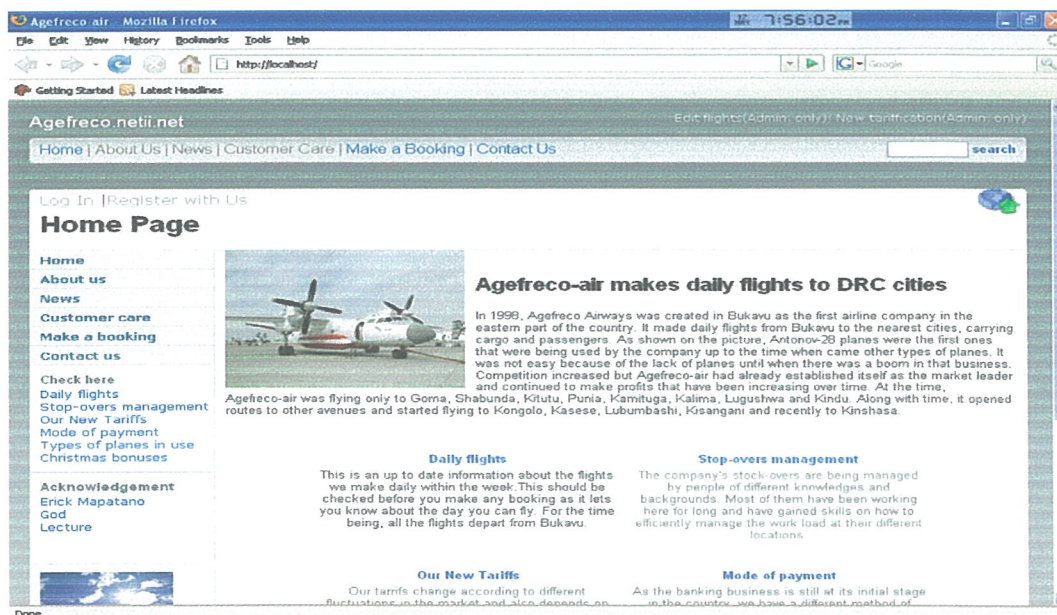
### 5.3.2 User training

Some of the personnel directly involved in the use of the new system were trained about it. The training involved how to check into the database, and as well, the interface of the website, how to edit and manage flights.

### 5.4 The developed system

Page1: Index or homepage

This is the main page that appears when the customer enters the URL of the site which is [www.agefreo.netii.net](http://www.agefreo.netii.net). It is the welcome page. It contains links to almost all useful pages of the website. Here we can find links to the Login page, the registration page, the about us page, the news page, the daily flights, the bonuses given at certain times and many more.



## Page 2: Registration page

It is the page that appears whenever a new user wants to register to the website. It contains many form elements such as text fields, radio buttons, select button, and so on.

Here the user can input his names, username, passwords, town where he is, gender, birth date and phone number to make sure the companies contains all necessary information about the customer.

registration page - Mozilla Firefox  
http://localhost/register.php

**Note: The fields marked with an asterisk are required and cannot be left unfilled**

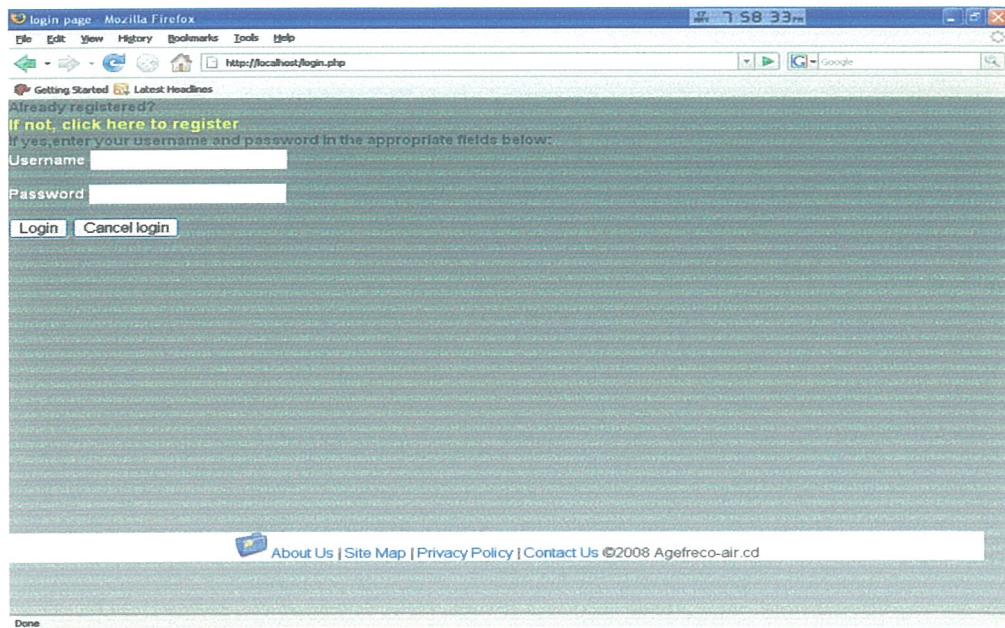
Name *	First: <input type="text"/>	Last: <input type="text"/>
Username *	<input type="text"/> *Please enter the username that you would like us to use for your authentication	
Password *	<input type="password"/> *Make sure you don't forget it. It will allow you to login	
Town and exact address	<input type="text"/>	
Email *	<input type="text"/>	
Gender *	Male <input checked="" type="checkbox"/>	
Birth Date *	0000-00-00 <input type="text"/>	Phone* +243(0) <input type="text"/>

☐ I agree to the above terms and conditions

## Page 3: Login page

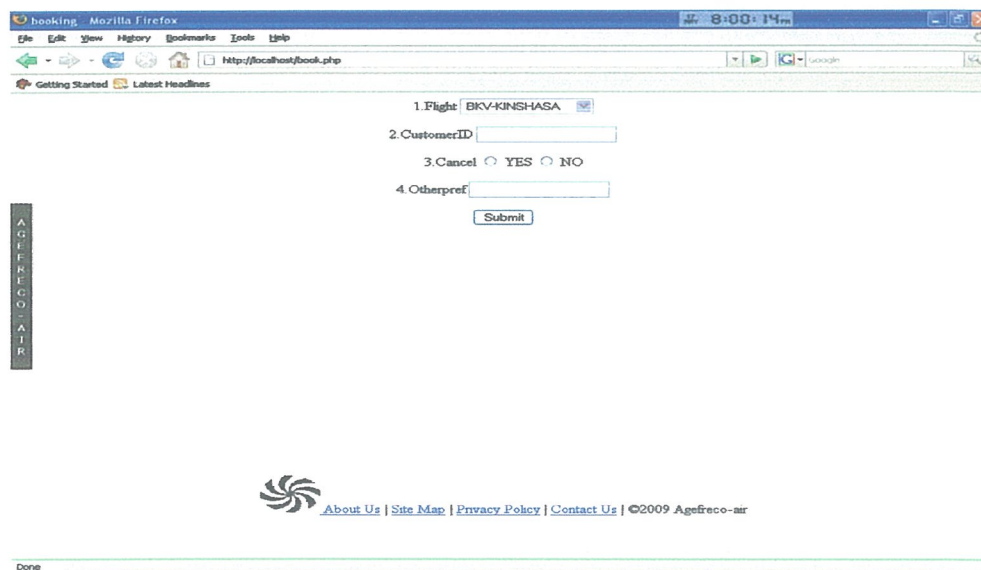
It appears when a customer, whether registered or not, wants to book for a flight. He has to enter his valid username and password in the appropriate fields to login; or if he has not yet registered he can simply click on to the yellow link to register.





#### Page 4: Booking page

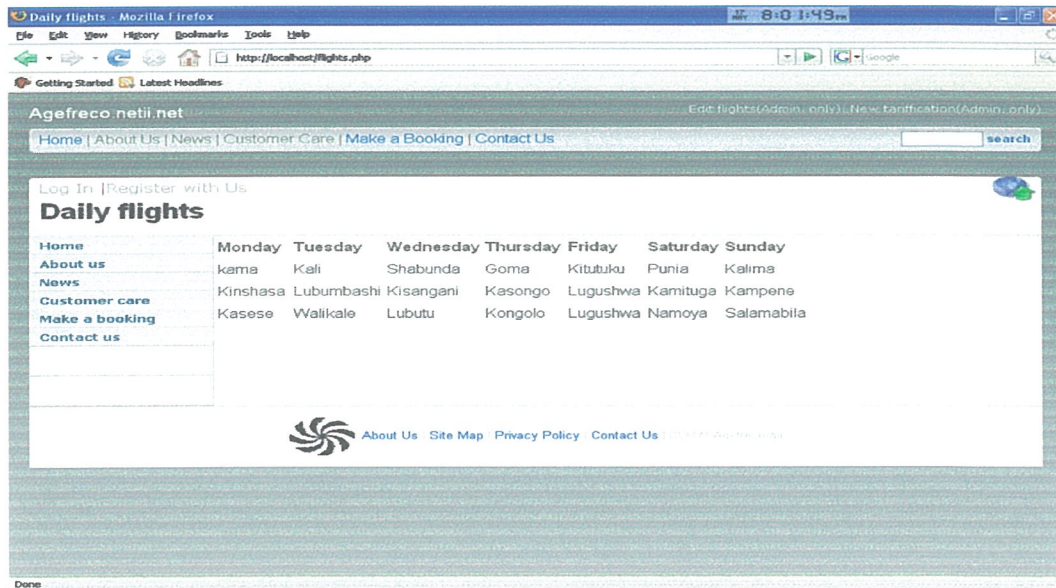
It appears when a customer has successfully logged in. He can therefore select the flight he wants to book for, enter his appropriate ID that was sent to his email address, and click on yes or no if he wants to cancel or not a flight he had registered for before.





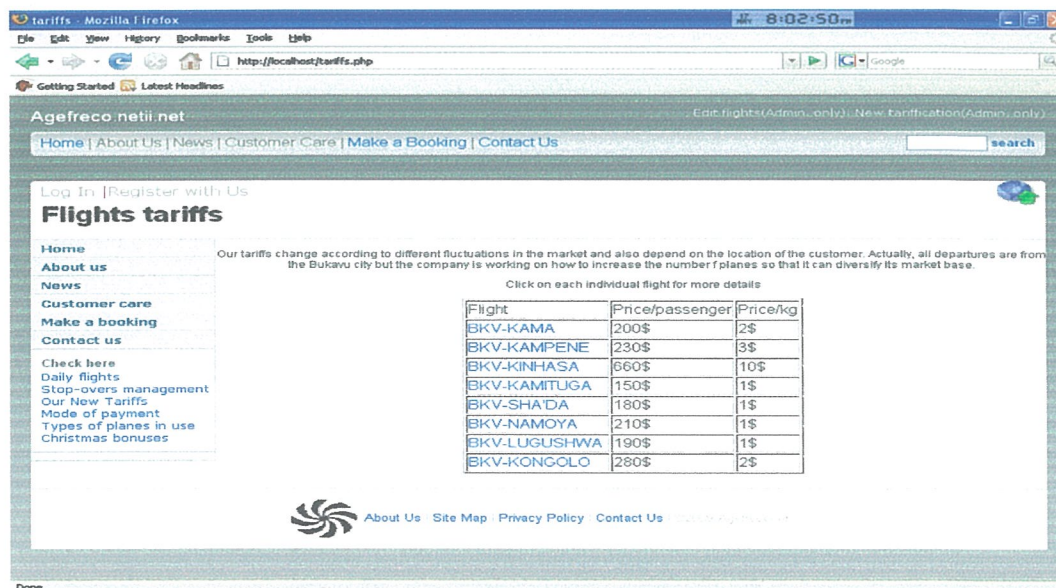
## Page 5: Daily flights

It appears when a customer wants to see the flights of the company, as scheduled daily i.e. Monday to Sunday with all destinations from Bukavu.



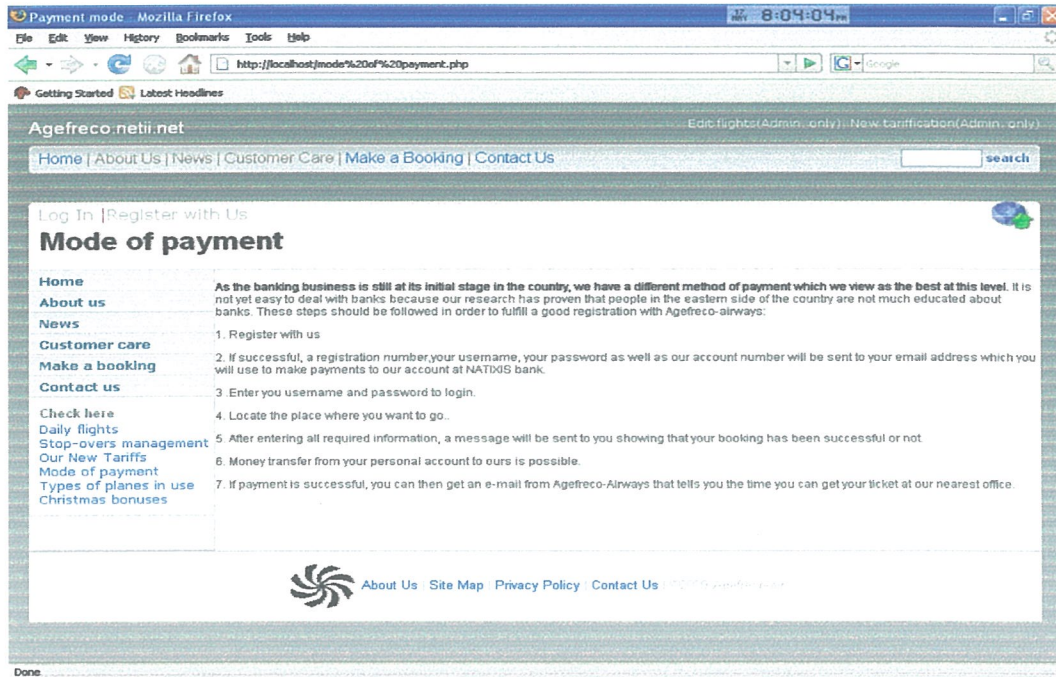
## Page 6: Tariffication page

It appears when a customer wants to see the tariff for passengers and for cargo. You can click on each flight to see more details about it.



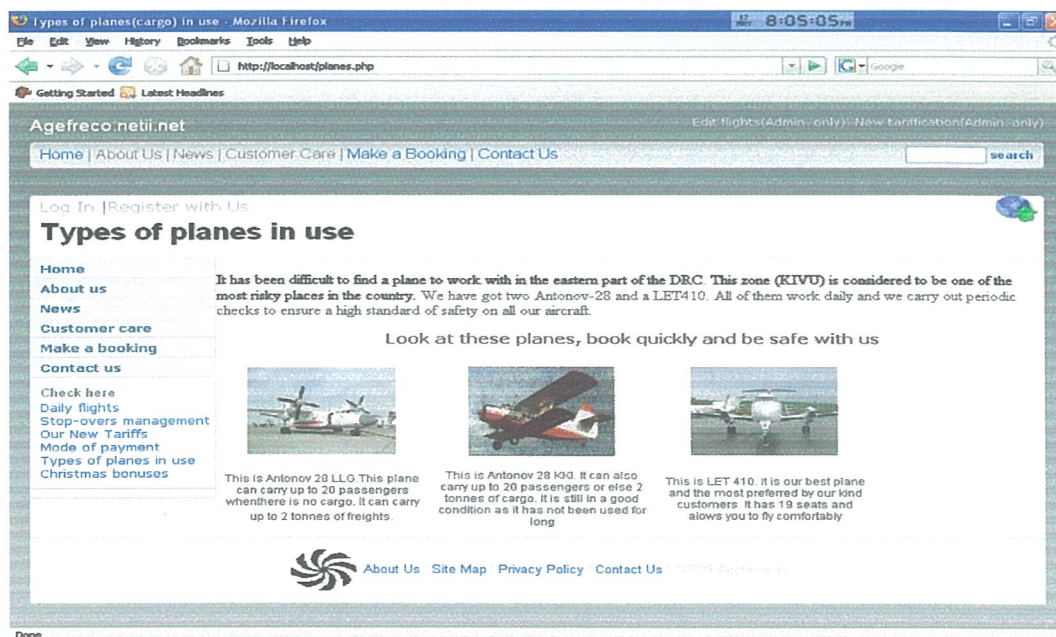
## Page 7: Mode of payment

This is when a customer wants to know how to make payment on line. It is mandatory for a new customer to read carefully the content of this page.



## Page 8: Planes in use

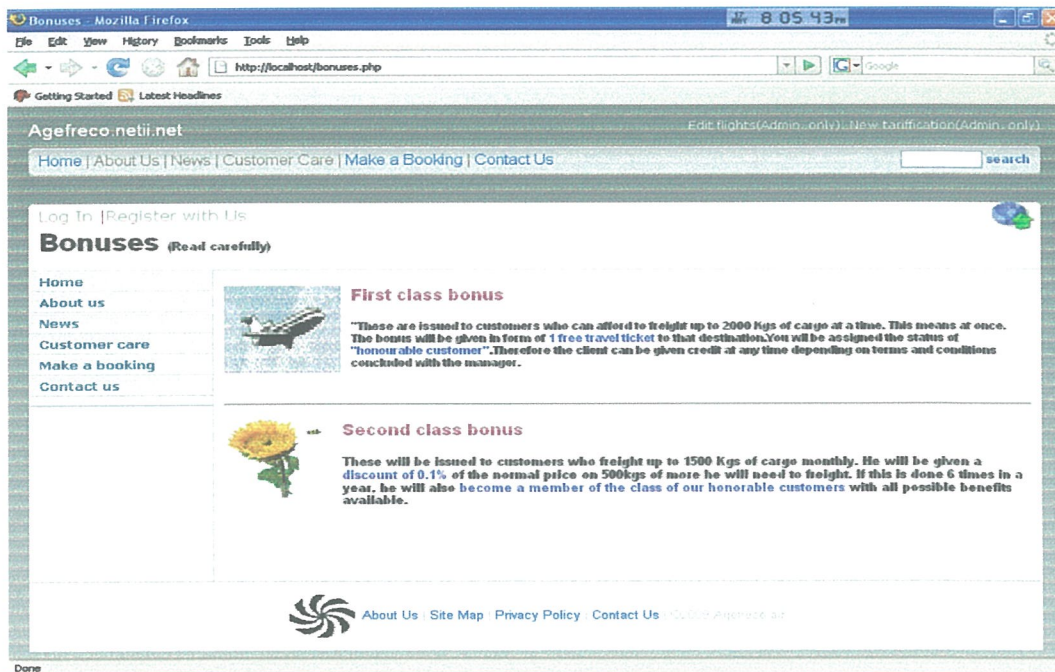
These are the type of planes being used by the company. They actually include Antonovs and Let 410 planes





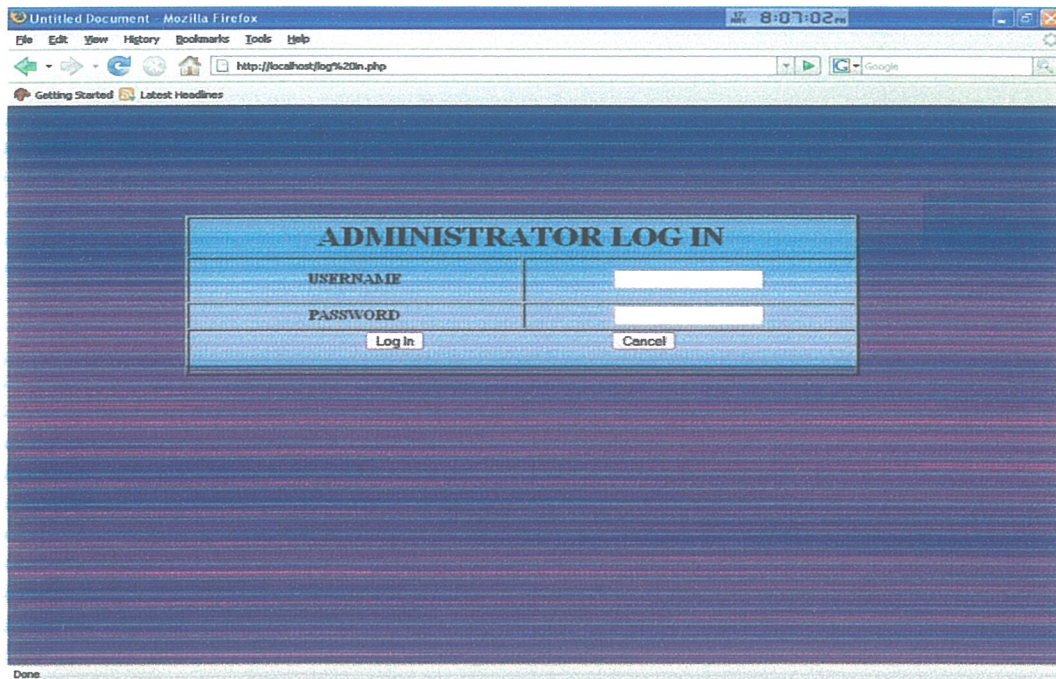
## Page 9: Bonuses

These are bonuses given at certain periods of times. These can change according to the management needs of the company. At this time, there is only first class bonuses and second class bonuses. To know more about these, you should find this page on the internet and read carefully the details.



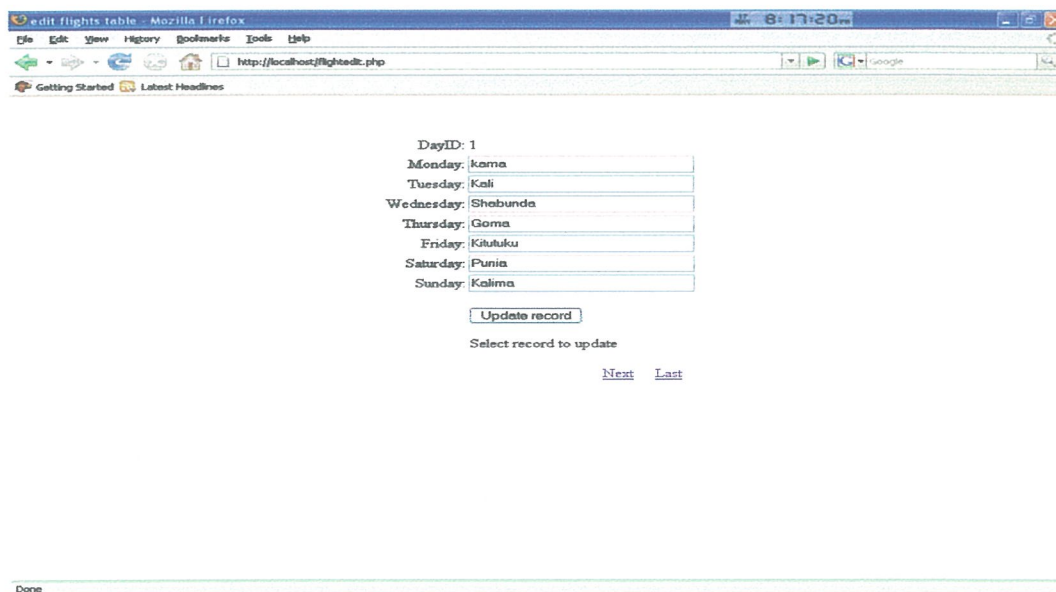
## Page 10: Admin login

This page lets administrators log in to edit flight schedules. They login by entering the username and the password. After logging in, administrators can edit flights by deleting, canceling and updating flights.



## Page 11: Editing flights

This is reserved to administrators only to update the table of flights in the database



**NB:** These pages are so many, that's why I will not display all of them but they are found online on the agefreco airways website

### **5.5 System evaluation**

-Security is well implemented in the website to ensure not all applications will be accessed by unauthorized users. This is done through the use of usernames and passwords.

-Adequacy: the system is correctly done with data validity in the sense that data with errors cannot be accepted. For example, a customer can not enter a date with characters in letters. A message is therefore sent specifying the error is.

## CHAPTER 6

### DISCUSSION, RECOMMENDATIONS AND CONCLUSION

#### 6.1 Discussion

Many websites have been developed with the same purpose as that of Agefreco Airways. These web based systems have increased the effectiveness and efficiencies of companies because of the ease they provide to owners of the company Susanna (2004) [19]. The central management can easily manage the business through these systems because of their centralized structure. Therefore, owners of the company can also check on bookings without having to wait for the clerks' reports.

This ease of use is also visible on the customers' side. The customers of the company can book for flights just by clicking on to the appropriate links. This makes it easy for customers who have internet connections not very far away from their homes and places of business to book avoiding the drive to the nearest ticketing locations.

The use of validation checks during data entry reduces the entry of erroneous data into the system and this improves the accuracy of computations. The website uses passwords at certain levels to make sure only authorized or registered users get access to appropriate pages.

However, the country's ministry of transport and telecommunications said that in 2008, very few Congolese airline companies had websites. This means that people should get to learn how to use this website. Therefore, the company should advertise more about this new system.

Another issue was that a large number of people previously didn't have Internet access. But there is progress on that matter as so many companies are providing Internet access to households at cheaper price and we thought that this could contribute to the success of the system

Finally, as I previously said that the banking business was still at its initial stage in DRC, people will have to understand that banking transactions online to be

carried with us will always be safe. But this may require establishing a relation of trust with customers which may take time.

## **6.2 Conclusion**

The study focused on the design and development of a website for an airline company. It also dealt with enhancing the effectiveness of the company's clients and staffs by making a more interactive and user friendly website.

In addition to this, the system has the great capability of limiting entry of erroneous data and very reliable security wise through the use of usernames and passwords. This was among the main reasons why the system had to be modeled and implemented.

So far, other Congolese airline companies should look for websites like this so as to achieve strategic objectives of becoming more vibrant, productive and efficient.

Lastly, the overall idea of this report was well addressed as I gave clear and concise information about the background to the study, scope and objectives of the project, statement of the problem, conceptual model and significance of the project, and lastly the methodology used. Through a good implementation of these procedures, Agefreco Airways will achieve the above stated objectives as a company.

## **6.3 Recommendations**

Managers of the company should employ a web master who will be in charge of maintaining this website. Furthermore, this technology is exposed to many threats like viruses and worms attacks, therefore managers must be aware of these and employ a web master, or by default, an Information Technology manager.

Also the new staff of the company should all be computer literate to avoid the misuse or misunderstanding of the system.

The company should advertise on its website to attract more customers and let people know how to use it.

### 6.3.1 Areas of further research

For the new system to be more effective and comprehensive, it is recommended that more functionalities be added to the website. These include the following:

- i. Separate profiles for users, containing all their personal data. This will create a possibility of multiple bookings per profile.  
On logging in, the user has options to book tickets, edit Profile information, cancellation of tickets, view all current tickets booked by him and logout
- ii. Finding flight schedule information according to various constraints and conditions and handling of flight schedules across multiple stops.
- iii. Handling of different kinds of schemes for frequent fliers, and for flights.



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**Appendix: A**

**General questionnaire used for the project. All answers are confidential.**

Name

Position held

Mobile phone number

Please tick where appropriate

1. What means do you use to store records at Agefreco Airways?

Physical ☐

Automated ☐

2. Do you easily find previous records in your files and folders?

Yes ☐

No ☐

3. How do you find the business process currently in use?

Fast ☐

Medium ☐

Slow ☐

4. Would you like to improve the business process currently in use?

Yes ☐

No ☐

5. How do you think people get to know better about the company?

TVs and Radios ☐ Friends ☐ Internet ☐

6. Have you ever heard about a website?

Yes ☐

No ☐

7. If yes, would you like to have one for the company?

Yes ☐

No ☐

### **Appendix B: General interview**

1. Name

2. Position

3. Is too much time being wasted on paper work?

4. Will you employ extra people for the different ticketing locations?

5. How long does it take to collect information about all bookings?

6. What do you know about a website?

7. Do you think a website would help to solve some of the company's problems?

8. Do you know what a database is?

If no, explain to him what it is

If yes, just proceed

9. Do you have a database that keeps records of all customer details and bookings?

10. If no, would you like to get one?

11. If yes, do you think it is performing well?