RESEARCH PAPER

AN ONLINE AIRLINE RESERVATION INFORMATION SYSTEM

CASE STUDY: RWENZORI AIRLINES

BY

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ARS:	Air Reservation System
CASE:	Computer-Aided Software Engineering
CRS:	Computer Reservation System
DB :	Data Base
DBMS :	Database Management System
DDL :	Data Definition Language
DFD :	Data Flow Diagram
DML:	Data Manipulation Language
DSS:	Decision Support Systems
EG:	Example Given
ERD:	Entity Relationship Diagram
FK:	Foreign Key
GB:	Giga Byte
GDS:	Global Distribution System
GUI:	Graphical User Interface
HTML:	Hypertext Markup Language
MB:	Mega Byte
MHz:	Mega Hertz
MIS:	Management Information Systems
PHP:	Hypertext Preprocessor
PK:	Primary Key
PSS:	Passenger Service System
RAM:	Random Access Memory
TCP/IP:	Transmission Control Protocol/ Internet Protocol
TPS:	Transaction Processing Systems

ABSTRACT

Airline Reservation Systems (ARS) used to be standalone systems. Each airline had its own system, disconnected from other airlines or ticket agents, and usable only by a designated number of airline employees. Travel agents in the 1970s pushed for access to the airlines' systems. Today, air travel information is linked, stored, and retrieved by a network of Computer Reservations Systems (CRS), accessible by multiple airlines and travel agents.

This report is a summary of the study that was undertaken to design and implement an airline reservation system. The airline reservation system designed in this project was developed using php, java script and html as the programming languages and Mysql as the database Management system. The researcher reviewed the literature of reservation systems in chapter two and explored the advantages and limitations of reservation system in real life situations.

The researcher used interviews and questionnaire methods during the data collection phase, these data collection methods helped the researcher to better understand the existing system in use. Case tools and data flow diagram were used during the development process to simulate the process of airline reservation and ticket booking. The outcome of the study was an online airline reservation system tested and implemented in the case study Rwenzori Airlines to book, schedule and reserve flights.

DEFINITION OF KEY TERMS

Airline Industry (Air Transport Industry**)**: This is an area of commerce that uses aircraft to transport people, cargo, and mail. The air transport industry encompasses flights of common carriers (government-certified companies that offer cargo and passenger services to the public) and general aviation (private aircraft used for recreation or business

Reservation: The written record or promise of an arrangement by which accommodations are secured in advance.

System: This is any collection of component elements that work together to perform a task. In computer science, System is used in a variety of contexts. A computer System is a hardware system consisting of a microprocessor and allied chips and circuitry, plus an input device (keyboard, mouse, disk drive), an output device (monitor, disk drive), and any peripheral devices (printer, modem).

Deregulation: The act of freeing from regulation (especially from governmental regulations).

Network: In computer science, a network is a system used to link two or more computers. Network users are able to share files, printers, and other resources; send electronic messages; and run programs on other computers

Computerize: To control a function, process, or creation by a computer.

CHAPTER ONE

1.0 Introduction

In science and technology, the desire for improvement is a constant subject which triggers advancements. This is visible in every ramification and the airline industry is not an exemption. Airline reservation systems were first introduced in the late 1950s as relatively simple standalone systems to control flight inventory, maintain flight schedules, seat assignments and aircraft loading. Today modern airline reservation systems are comprehensive suites of products to provide systems that assist with a variety of airline management tasks and service customer needs from the time of initial reservation through completion of the flight. Winston, (1995) [25]

The World Wide Web has become tremendously popular over the last four years, and currently most of the airlines have made provision for online reservation of their flights. The Internet has become a major resource for people looking for making reservations online without the hassle of meeting travel agents by implementing an online reservation system this ensures that reservation are not only generated by the airline own staff but also by any travel agent using a Global Distribution system or other airlines that have a multilateral Interline Traffic Agreement with the airline Winston, (1995) [25].

A Computer Reservations System is a computerized system used to store and retrieve information and conduct transactions related to travel. Computer reservation systems are classified as Passenger Service Systems (PSS) which handles a series of critical functions for the airline. For an Airline, the reservation system is a mission critical system that should use the latest state of the art technology to provide for all flight reservations on a robust platform, which is flexible and can be adapted to any style of airline. Secure and stable systems are vital to the airline industry which is why companies spend many years designing an architecture specifically suited to the nature of the airline industry which often requires tens of thousands of users to access and use the system simultaneously Wikipedia, May, (2012) [24].

1.1 Background of the Study

Rwenzori Airlines started as a small airline carrier in 1989 to facilitate air travel between Uganda and the Democratic Republic of Congo. This airline was to facilitate transportation of cargo

between the two countries. The airline was originally designed to handle small number of customers. In 1999 Rwenzori Airline was transformed into an International Airline facilitating travel of tens of thousands of passengers on a daily basis. Today Rwenzori Airlines still use a manual system of flight booking, flight management and scheduling. Flight booking is done through travel agents across major towns, flight data and customer details are kept in manual files. This system is slow and results into booking conflicts, vacant seats in some planes and it is hard to quickly obtain customer information in case of emergency. It's for this reason, the researcher set out to design an online airline reservation system to provides a modern, flexible reservation and inventory management solutions including call Centre, travel agency, internet engine, global distribution systems and interlines booking with case study of Rwenzori Airlines

1.2 Problem statement

The current system is manual, this system is slow, time consuming and it is very difficult for each person to book through office agents. Users inquire about the tickets through phones and it is very difficult for the user to remember all the details that they received through phones. It is very difficult to calculate how many peoples registered and how many seats on a particular plane are vacant .This requires quite a lot of time and wastage of money as it requires quite lot of manpower to do.

1.3 Objectives

1.3.1 General Objective

To automate the process of airline ticket reservation, booking and airline management hence minimize errors resulting from manual system operations

1.3.2 Specific Objectives

- To study the current system identifying its inefficiencies
- To determine the requirements for the new system
- To design an online airline reservation information system to facilitate online booking and flight scheduling
- To implement the developed web based airline information system
- To test and validate the developed system by use of case study

1.4 Scope of the Study

The developed system will facilitate online booking; keep customer records, provides an online menu on flight schedules, flight destinations and their prices, show alternative links to other partner airlines and will have page dedicated to customer queries and replies. The system excludes catering for calculating staff salary and other management issues.

1.5 Significance of the Study

From the viewpoint of the airline; the system will provide among other things the following;

Minimize repetitive work done by the system administrator and reservation clerks. Maintain consistency among different access modes, e.g. by phone, by web, at the information desk and across different physical locations. Maintain customer information in case of emergency, e.g. flight cancellation due to inclement weather. Minimize the number of vacant seats on a flight and maximize flight capacity utilization

Reduce effort and frustration for travelers in scheduling a trip, especially by reducing the search effort for the flight they need to take. In addition, the outcome of this study will provide a basis for developing the appropriate approach to the problems associated with air traveling operations in relation to Airline Reservation Systems

CHAPTER TWO

LITERATURE REVIEW

2. 0. Introduction

In the arena of global competition, organizations all over the world are competing through the use of the most comprehensive and advanced technological features. The most common example of innovation is in the area of information technology and communication. Various industries are using technology and the advancements of software and internet to maintain and monitor their business transactions. In the application of the informative systems, the airline industry is the most commonly used system. This chapter explores the concept of reservation information system, their history, components, types and their applications in real world situation to solve problems

2.1 History of Airline Reservation Information System

American Airlines was the first to establish an automated booking system in 1946. Using a system to track information and improve efficiency was a highly appealing aim in the industry, and drew the attention of other airlines worldwide. The system endured years of development and alterations. Later, other airlines invested more in research and development to launch improved systems, and through the late 1960s and early 1970s, airlines established their own systems.

United Airlines developed the Apollo Reservation System, and shortly after allowed travel agents access. The Apollo system was the foundation for many further developments, which spread from just US airlines to European airlines as well. The research and development of Airline Reservation System became a significant aspect of the industry and all its air carrier companies, and partnerships between airlines and technology gurus emerged. Winston (1995) [25]

Other airlines soon established their own systems. Delta Air Lines launched the Delta Automated Travel Account System (DATAS) in 1968. United Airlines and Trans World Airlines followed in 1971 with the Apollo Reservation System and Programmed Airline Reservation System (PARS),

respectively. Soon, travel agents began pushing for a system that could automate their side of the process by accessing the various Airline Reservation Systems directly to make reservations. Fearful this would place too much power in the hands of agents; American Airlines executive Robert Crandall proposed creating an industry-wide Computer Reservation System to be a central clearing house for United States travels; other airlines demurred, citing fear of antitrust prosecution. Wikipedia, May, (2012) [24].

Airline deregulation occurred in 1978, magnifying the importance of computerized airline reservation systems and their accessibility. During the early 1970s, as travel agents pushed for access to reservation systems, and certain airline executives made investments for the sake of accessing the systems of other airlines, antitrust laws came into focus. The purpose of the 1978 Airline Deregulation Act in the United States was to eliminate government control over commercial aviation, and ensure competitive behavior and fair business practices in the airline industry. Passengers could gain knowledge of market forces and new market entry in the industry. Information on specific airlines and the industry as a whole became more widely and readily accessible, evolving the airline reservation systems from "standalone" operations toward GDS. Today, airline reservation systems have developed into computerized reservation systems which are of mission critical to the airline industry, about six major airline reservations systems are used by international airlines. Winston, (1995) [25]

2.2Reservation Information Systems

The airline reservations system was one of the earliest changes to improve efficiency in the airline industry. Airline Reservation System eventually evolved into the computer reservations system (CRS). Airline Reservations System (ARS) is a computerized system used to store and retrieve information and conduct transactions related to air travel. The systems was originally designed and operated by airlines, but were later extended for the use of travel agencies. Wikipedia, May, (2012) [24].

Major airline reservation system operations that book and sell tickets for multiple airlines are known as Global Distribution Systems (GDS). Airlines have divested most of their direct holdings to dedicated GDS companies, who make their systems accessible to consumers through

Internet gateways. Modern Global Distribution Systems typically allow users to book hotel rooms and rental cars as well as airline tickets. Wardell, David (1991) [23].

Global Distribution Systems(GDS) is a worldwide computerized reservation network used as a single point of access for reserving airline seats, hotel rooms, rental cars, and other travel related items by travel agents, online reservation sites, and large corporations. The premier global distribution systems are Amadeus, Galileo, Sabre, and Worldspan. They are owned and operated as joint ventures by major airlines, car rental companies, and hotel groups. Global, May, (2012) [9].

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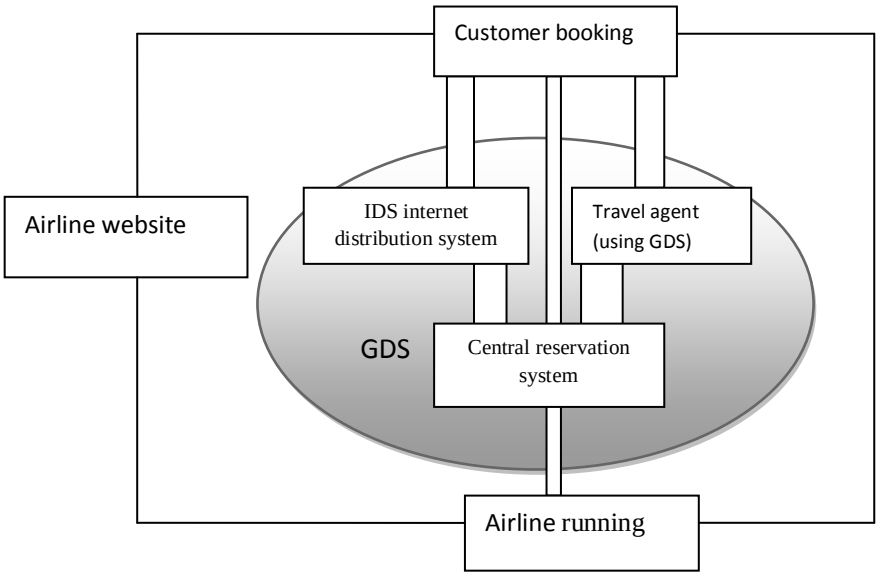


*Figure 2.1 showing a global distribution system**;** adapted from Reservati*onInterfaces, May, (2012) [20]

2.3 Components of Reservation Information Systems

These are complete Information Technology subsystems that make the reservation Information System operational; they are compatible in nature and the failure of one component may affect the operation of the others with in the system. They consist of computer resources, data, people, and procedures used in the modern business enterprise.

2.3.1 Hardware

O'Brien (2001) [12] defines hardware as individual physical devices and material used in information processing. Specifically, it includes not only machines like computers but also data media i.e. all tangible objects on which data are recorded from sheets of paper to magnetic disks. Others include keyboards, mouse, printers, scanners etc.

2.3.2 Software

Rochester *et al.*, (1996) [21] assert that software includes all sets of information processing instructions and it comprises of different types of programs that enable the hardware to carryout different tasks. Software is further categorized into system software and Applications software. System software is concerned with keeping the computer system working while Application software is the general purpose or written for a specific task like stock control. It may be written using a programming language or more general purpose piece of software such as database.

2.3.3 Data

Rochester *et al.*, (1996) [21], defines data as all raw and unprocessed facts that can readily be used. Cleary no database system can exist without data. The basic factor upon an organization's processing and information needs are founded. Data elements and relationships must be precisely defined and the definitions must be accurately recorded in the data dictionary.

2.3.4 People

According to O'Brien (2001) [11], these are required for the operation of all information systems. They include end-users and information system specialists. End-users are people who use an Information System. The reservation information system specialists help in the development and operation of information system. They include system analysts, programmers, computer operators and others. People, are probably the component that most influence the success or failure of information systems

2.3.5 Procedures

These are set of instruction about how to combine the above components in order to process the information and generate the desired output. They consist of the way how to log on to the DBMS, use of different forms and manipulations throughout the project.

2.3.6 Database

Merril Wells, (2002) [14] defines Database as a collection of non-redundant data, which can be shared by different application systems. Or database is a collection of data as well as programs required to manage that data. According to Merril Wells the importance of data has been obvious from time immemorial. Before the advent of computers, this was written in books or registers; these could be considered as 'manual' databases. Ever since computers were introduced as a means of sorting data, the concept and structure of a database have undergone a sea change. Database creation and maintenance is a gradual and continuous procedure being influenced by system software such as database management systems.

Database users state their requirements to the database using the data definition languages (DDL) and the data manipulation languages (DML) via the database management systems. The database management system surely provides an interface between the users programs and contents of the data base. During the creation and subsequent maintenance of the data base contents, the DDL and the DML are used for the following, add new files, expand the database, delete the absolute records, adjust data, and expand the database capacity, link up the data items and many others.

2.4 Types of Reservations in Reservation System

Guaranteed Reservation: This insures that the company will hold an item for the customer until a specific time following the customer's scheduled date. In return, the customer shall guarantee his/her reservation of an item unless reservation is properly canceled. In order to guarantee a reservation, customers might opt for one of the following methods.

- Prepayment guaranteed reservation
- Credit card guaranteed reservation.
- Advance deposit or partial payment
- Travel agent guaranteed reservation

Non-guaranteed Reservation: Insures that the company agrees to hold an item for the customer until a stated reservation cancellation hour on that day. A reservation agent always makes sure to encourage their customers to guarantee their reservations especially in the high season

2.5 Types of Information System

Information System is a combination of people, hardware, software, communication devices, network and data resources that processes (can be storing, retrieving, transforming information) data and information for a specific purpose. The types are;

2.5.1 Transaction Processing System (TPS)

This is a computerized system that performs and records daily routine transactions necessary to the conduct of the business. TPSs are information systems that process data resulting from the occurrence of business transactions. Example: payroll system; production instructions. Kanter (1997), [12]

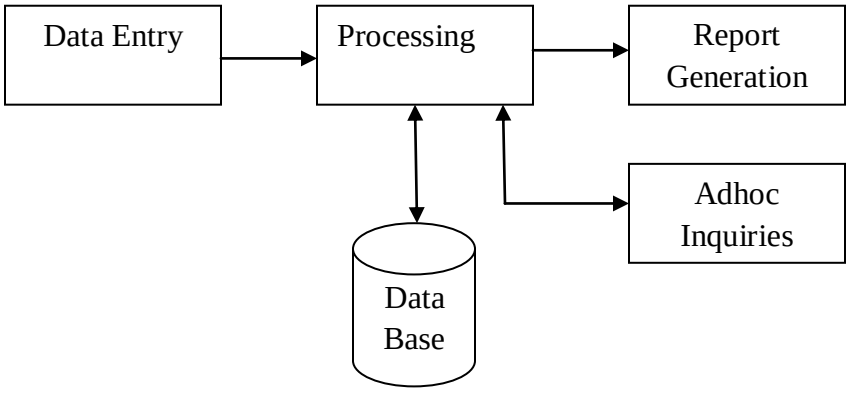


Figure 2.2 Five Stages of Transaction Processing System

2.5.3 Management Information System (MIS)

These are mainly concerned with internal sources of information. MIS usually take data from the transaction processing systems and summaries it into a series of management reports. Hence MIS provides information for managing an organization. Information from MIS helps managers to monitor and direct the organization.

2.5.4 Decision-support systems (DSS)

These are specifically designed to help management make decisions in situations where there is uncertainty about the possible outcomes of those decisions. DSS comprise tools and techniques to help gather relevant information and analyze the options and alternatives. DSS often involves use of complex spreadsheet and databases to create "what-if" models Finley *et al.*, (1994) [8].

2.5.5 Executive Support System (ESS)

This is designed to help senior management make strategic decisions. It gathers analyses and summarizes the key internal and external information used in the business. A good way to think about an ESS is to imagine the senior management team in an aircraft cockpit with the instrument panel showing them the status of all the key business activities. ESS typically involves lots of data analysis and modeling tools such as "what-if" analysis to help strategic decision-making .Stair, (1996) [22].

2.6 Application of Reservation Systems

Computer Reservations Systems (CRSs) are used for hosting airline seat inventory and seat reservation transactions. Originally designed, owned and operated by airlines, the use of CRSs had been extended to travel agents as a distribution tool. Over the years CRSs have evolved into Global Distribution Systems (GDSs) that host inventory of multiple airlines and other modes of travel and travel related associated services such as room reservation, ticket reservation systems for football games, train reservation for reserving train seats and many more others Nasim (2010) [15].

2.7 Advantages of Reservation Information Systems

Convenience; One advantage of booking a hotel, flight or car rental online is the convenience. Being able to make all your travel plans on the Internet means you can do it any time of the day or night at home, or while you are on your lunch break at the office. Customers on the go can even make reservations on their smartphones or tablets. There is no need for lengthy phone calls or visits to a travel agency, with just a few minutes and a click of the mouse, you will have all your plans finalized, Diane, (1993) [6]

Changes and Cancelations; it is simple for travelers to change or cancel online reservations. Instead of calling the hotel or airline and waiting for a customer service representative to help you through the process, booking online means you can do it wherever you have Internet access.

Customer Reviews; Making a reservation over the phone or at a travel agency does not allow you to check out what past customers have thought of hotel chains or certain airlines. Another benefit of making online reservations is being able to see these customer reviews. Diane, (1993) [6]

2.8 Limitations of Reservation Information System

Live Help, when you book online, you usually can't ask a live person questions about hotel rooms, flight routes, visa requirements or anything else you're concerned about.

Customization; Many travel websites can't handle complicated itineraries, like a trip that combines train, bus and plane travel. Diane, (1993) [6]

Hidden Fees; Many online travel sites advertise low rates to attract your attention, and then add fees and surcharges for a much less competitive deal. Diane, (1993) [6]

Limited Validity; The bargain rates that make booking online appear so attractive often mean giving up flexibility in your dates of travel or other such constraints. Diane, (1993) [6]

Limited Options; Some small inns and tour guides may not have an online presence. If you only look for businesses that have websites and online booking capability, you could miss out on some local color.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The methodology describes the procedures, tools, techniques that were employed to achieve the specific objectives of the airline reservation system for Rwenzori Airlines. The development of the System was based on the model below. It involved requirement determination, requirement analysis, system design, implementation, testing and validation. This approach below describes the sequence of steps involved.

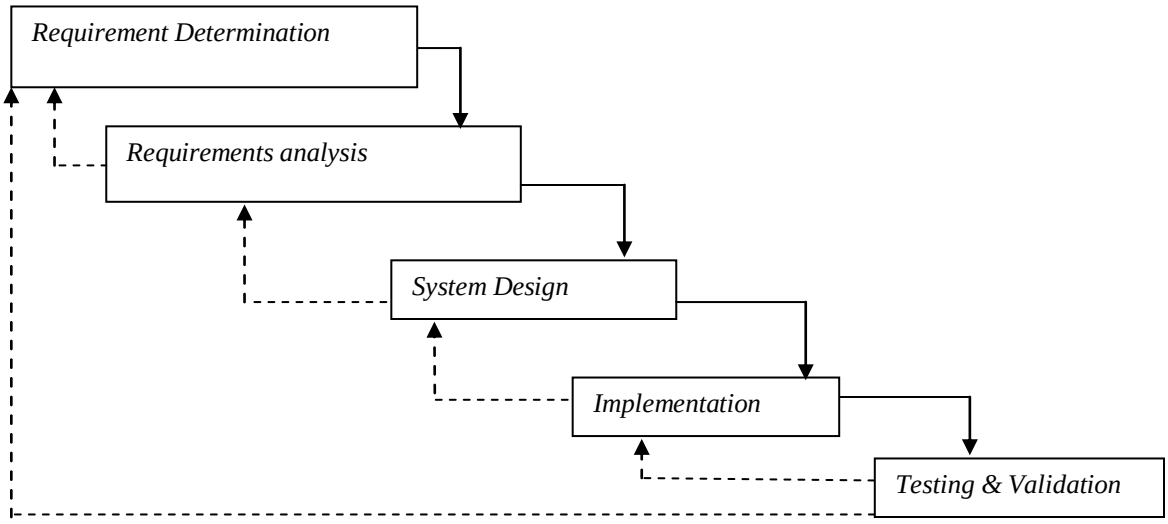


Figure 3.1 the system study and design model

3.1 System Study and Analysis

This was carried out on the existing system. It helped to show the weaknesses of the existing system. The researcher used various methods to collect information about the current system as shown below.

3.1.1 Interviews

These were carried out on Rwenzori Airlines' staff who are the current users of the system in use. These were about how customers book specific seats on flights, how customer data and

information is stored and how flight scheduling and management is done. A set of interview guide were designed by the researcher these questions guided the researcher during the interview

This method had the following advantages;

i. The researcher was exposed to firsthand information from the current administrators of the current system; this helped the researcher to get the feel of the current system
ii. The researcher was able to ask follow up questions and this helped him to gain more insight into the current system

Disadvantages of this method

i. This method was time consuming and tiresome since it involved interviewing a big number of Rwenzori Airlines' staff
ii. Some of the interviewees didn't show up for the interview

Because of these disadvantages the researcher used a second method in order to better understand the current system.

3.2.2 Questionnaire

The researcher used questionnaire to gather information from customers or clients who would come to the airline head offices to book and check in when their flights are due. The researcher used both a combination of open ended and closed questionnaire. The respondents were asked to tick their choice from a given number of choices. Also the respondents were asked to describe the current system in their own words. The questionnaire were distributed and later picked when they were already answered

Advantages of this method were;

i. It resulted into a wide range of views from different users about the system in use and this better helped the researcher to fully understand the current manual system.
ii. This method provided clear mind facts about the current system and this helped the researcher in understanding fully the weaknesses of the current system in use

However this method had its disadvantages and these were;

i. Some handwriting were unreadable
ii. Some views deviated from the question

In this section above the researcher achieved his first objective

3.3 Requirements Determination

The requirement determination involved the collection of information about how the system should operate. The requirements determination activity was the most difficult part of systems analysis. It involved gathering and documenting of the true and real requirements for the system being developed. In here the researcher was primarily thinking and trying to answer the question, "What must the system do?" This information was used to identify the users' requirements and the system specifications.

3.3.1 Requirements Analysis

The primary goal of this phase was to create a detailed Functional Specification defining the full set of system capabilities to be implemented, along with accompanying data and process models illustrating the information to be managed and the processes to be supported by the new system

It involved examination of the collected data. Models such as Data Flow Diagrams (DFD) and Entity Relationship Diagrams (ERD's) were used to model individual processes and data respectively. Under here requirements were classified as functional and nonfunctional requirements, the determination and analysis of requirements helped the researcher to achieve his second objective

3.4 System Design

This showed the application of system theory to product development by defining the architecture, components, modules, interfaces and data for a system to satisfy specified requirements. The goal of design phase was not just to produce a design for the system; instead it was to find the best possible design within the limitations imposed by the requirements and the physical as well as the social development in which the system was to operate Stair, (1996)[7]. The system design process was divided into logical, conceptual and physical design

In Logical design; the logical model of the system was developed indicating all the vital steps the system development went through. Here, the researcher used case tools like flow charts and data flow diagrams. Conceptual design was a description of the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave, and look like, that was understandable by the users in the manner intended. The Physical design was the physical realization of logical design. Tables, forms and reports were created and relationships defined among these tables and security constrains set during the physical design the researcher translated the expected schemas into actual database structures. In here the researcher achieved his third objective

3.5 System Implementation

This involved putting together or building various elements of a system for example Mysql/PHP for database Wamp Server for hosting the web pages. This is the stage in which the actual system was recognized. The technical architecture defined in the design stage was the baseline for developing the system. The interface ware designed using HTML, PHP, and Java script languages. This is because these languages provided tremendous friendly user interfaces; that is easy to learn and affordable. The database was designed in MYSQL basing on Wamp Server software. MYSQL provides a high level of security to the database, that is, authentication which can either be during the logging in to the database or on DML commands such as delete, add or even edit, it also reduces redundancy. In here the researcher achieved his fourth objective

3.6 System Testing

This involved testing the system in order to correct errors or remove defects that rose. This stage involved testing the source code to make sure that it produced the expected and desired results when subjected to a set of predefined conditions. It was subdivided into three major phases, that is, unit testing, system testing and user acceptance testing.

Under unit testing, specific parts of the source code were tested. Emphasis was put on the website-database connections to ensure that information sent by a user from the web page form reaches the systems database.

System testing involved putting the entire software to test in order to find out whether or not the functional requirements of the system had been efficiently and effectively integrated and satisfied

Finally User acceptance testing was done; this was a key factor for the success of the system performance. The system under consideration was tested for user acceptance by constantly keeping in touch with the system users that is, the airline customers and staff.

3.7 System Validation

The system was used by different customers to book seats and by different staff to schedule airplanes. And indeed the seats were reserved and flights schedules were on time. This helped the researcher to achieve his last objective

CHAPTER FOUR

SYSTEM DESIGN, ANALYSIS AND IMPLEMENTATION

4.0 Introduction

This section describes the tools that were used to develop and implement the system. These include the context diagram, level zero, and one data flow diagram. These tools helped in designing the system and coming up with the main concept and logic of the system. Once information systems development progressed to the design activities, the researcher who was at the same time systems analyst and programmer focused his attention on the question, "How does the system do what it is supposed to do?"

4.1 System Design Objectives

The Airline Reservation System (ARS) is a software application to assist an airline with transactions related to making ticket reservations, which includes blocking, reserving, canceling and rescheduling tickets.

From the viewpoint of the airlines the system provides the following

1. The system should minimize repetitive work done by the system administrator and reservation clerks.
2. The system should maintain customer information in case of emergency, e.g. flight cancellation due to inclement weather.
3. The system should minimize the number of vacant seats on a flight and maximize flight capacity utilization.
4. The system should reduce effort and frustration for travelers in scheduling a trip, especially by reducing the search effort for the flight they need to take.
5. The system should make it easy for travelers to check the ticket status or make changes to their trip.

4.2 System Design

This was divided into Logical, conceptual and physical design

4.2.1 Logical design

In this case the logical model of the system was developed indicating all the vital steps the system development went through. In this, the researcher used case tools like flow charts and data flow diagrams. These models were vital in the development of the system. This stage included the graphical user interface design, input design in which the user inputs in data, the output design which displays the results of what a user will have entered, and database design where data is stored for easy management. These designs provided the technical blueprint from which the system was built. A combination of layout tools such as hand sketches and CASE tools were used to come up with both input and output designs. Database design was based on the Relational data model and the database management system employed was MySQL.

4.2.2 Conceptual design

This was a description of the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave, and look like, that will be understandable by the users in the manner intended. The process begun with identifying the entities required by the users and then identifying all the important relationships that exist between the entities. The result was the model of the user interface that has been developed.

4.2.3 Physical design

This was the physical realization of logical design. Tables, forms and reports were created and relationships defined among these tables and security constrains set. During the physical design the researcher translated the expected schemas into actual database structures and at this time, he had to map:

i. Entities to tables
ii. Relationship to foreign key constraints
iii. Attributes to columns primary unique identifiers to primary key constraints
iv. Unique identifiers to unique key constraints

v. Attributes to columns.

The system has been developed on the following requirements;

4.3 Functional Requirements

The following requirements were captured for the intended use of the system.

User account

The registered user can directly do the booking of flights and if there is a new user he may register or he only sees the flight details. But for the reservation of ticket he must register first.

Creation of new user account

When there is a new customer he should fill the form containing field like Name, Address, and Contact No. , Gender, Email_ id, Age and also User_Id and Password.

Checking Availability

To check the available flight the user should input the origin city and destination city, date of journey.

Reservation of Flight

After providing all information the system will ask user for confirmation. After confirming the information the seats get reserved.

Canceling / Rescheduling of Ticket

To cancel the reservation the customer should provide the details about Ticket no and flight no

4.4 Non-functional requirements

The application was designed to fulfill the following non-functional requirements.

Performance Requirements

Performance of the system is dependent on the bandwidth of the internet and also the hardware itself.

Security Requirements

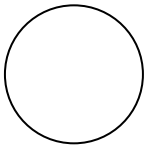
There is only one authorized person who can see the confidential Information. The information of the customer is only available for the administrator.

Software Quality Attributes

The system is very user friendly, interoperable and flexible

4.5 Data Flow Diagrams

Symbol Description for data flow diagram



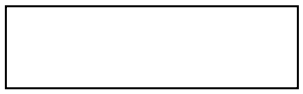
Process

Entity

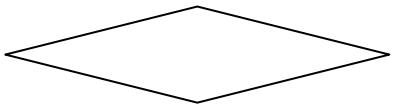
Data store

Data Flow

Symbol Description for the Entity Relationship Diagram



Entity



Relationship

Cardinality

4.5.1 Context Diagram for Airline Reservation System

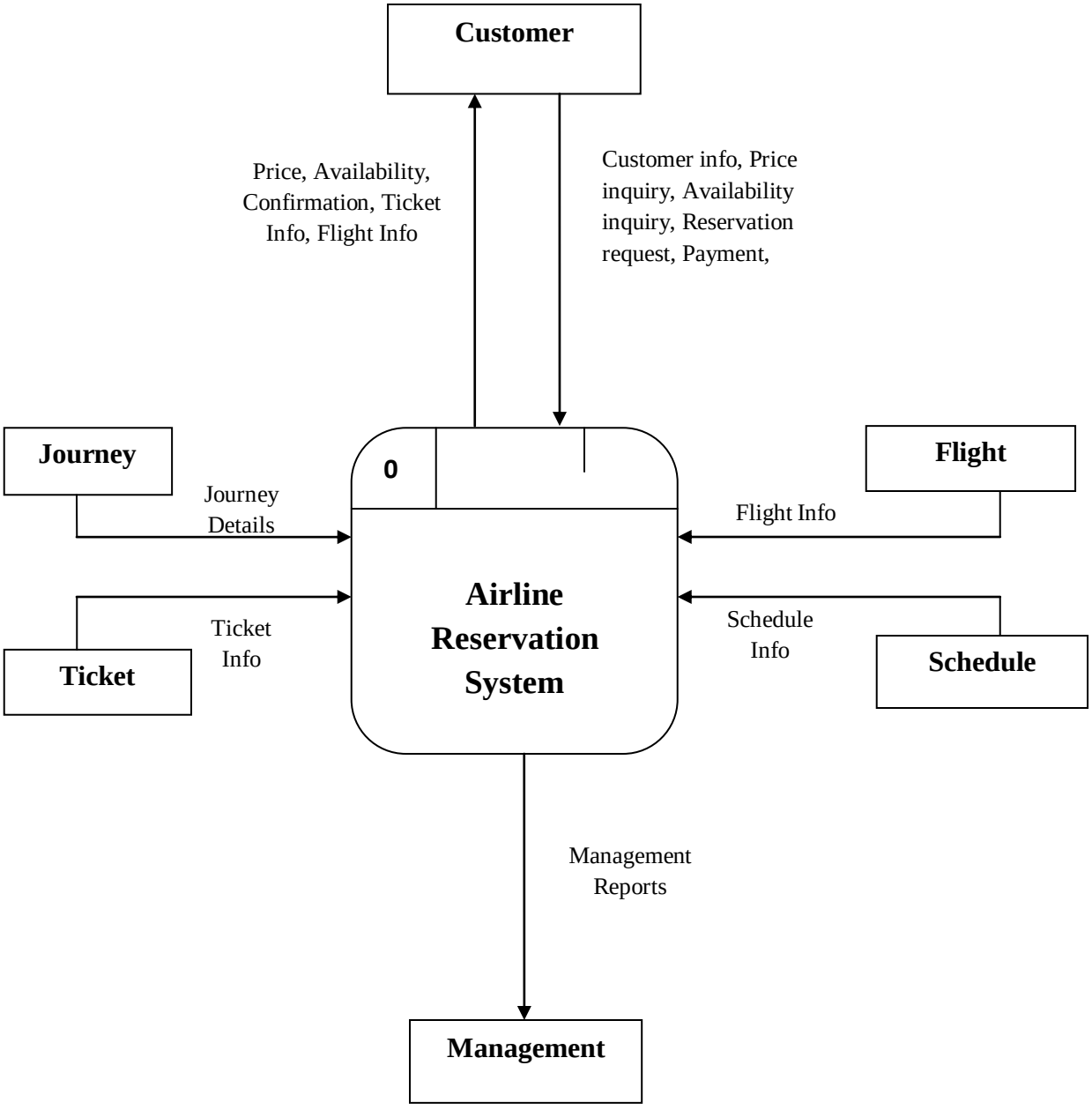


Figure 4.1 showing a context diagram for a reservation system

4.5.3 Level One Data Flow Diagram for Reservation Process

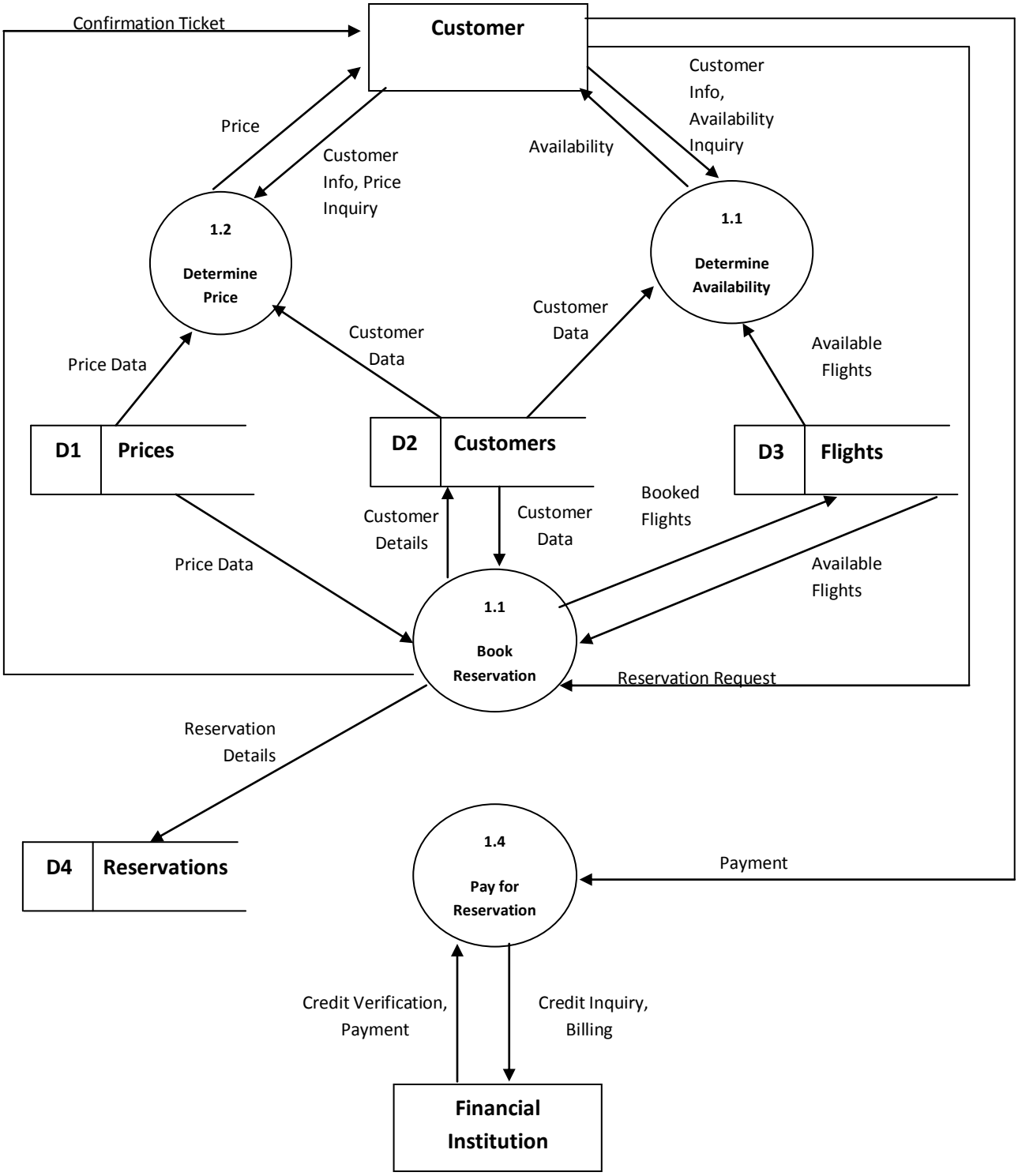


Figure 4.2 Level one data flow diagram for the reservation process

4.6 System Component Interactions

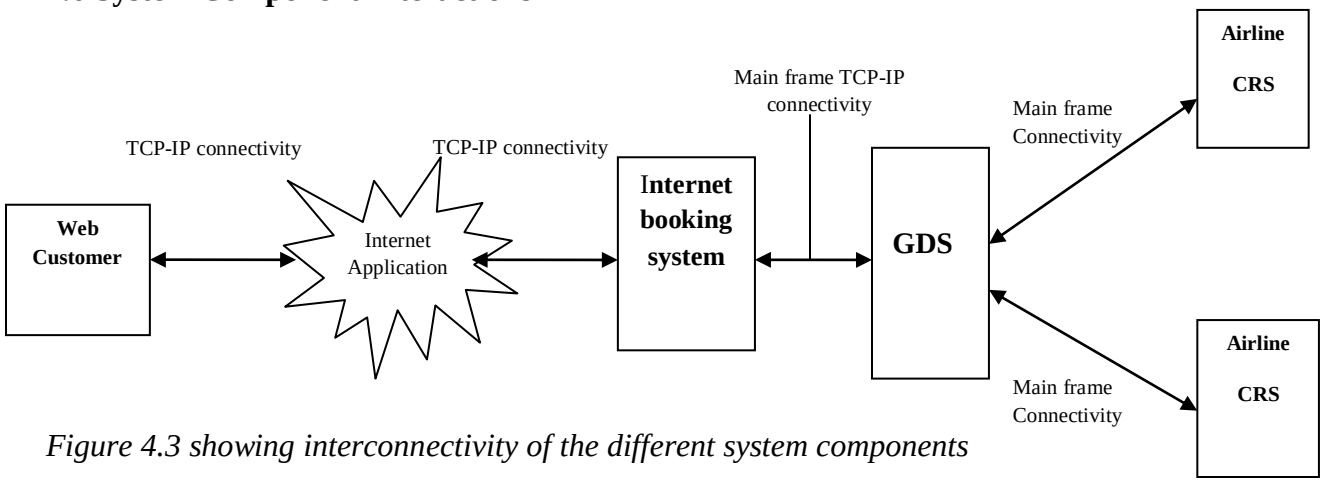


Figure 4.3 showing interconnectivity of the different system components

4.7 Database design

Under this section, the various entities, their corresponding attributes and data types, as well as the relationships among them were defined basing on the user requirements. It also involves the construction of a suitable data model for the system

4.7.1 Entities

a. Passenger (customer)

The person who is booking for purposes of travel

b. Flight detail

The airplane to travel in

c. Journey details

The details of the planned destination

d. Ticket details

The details of the ticket

e. Schedule details

Details of the journey schedule

4.7.3An Entity Relationship Diagram for Airline Reservation

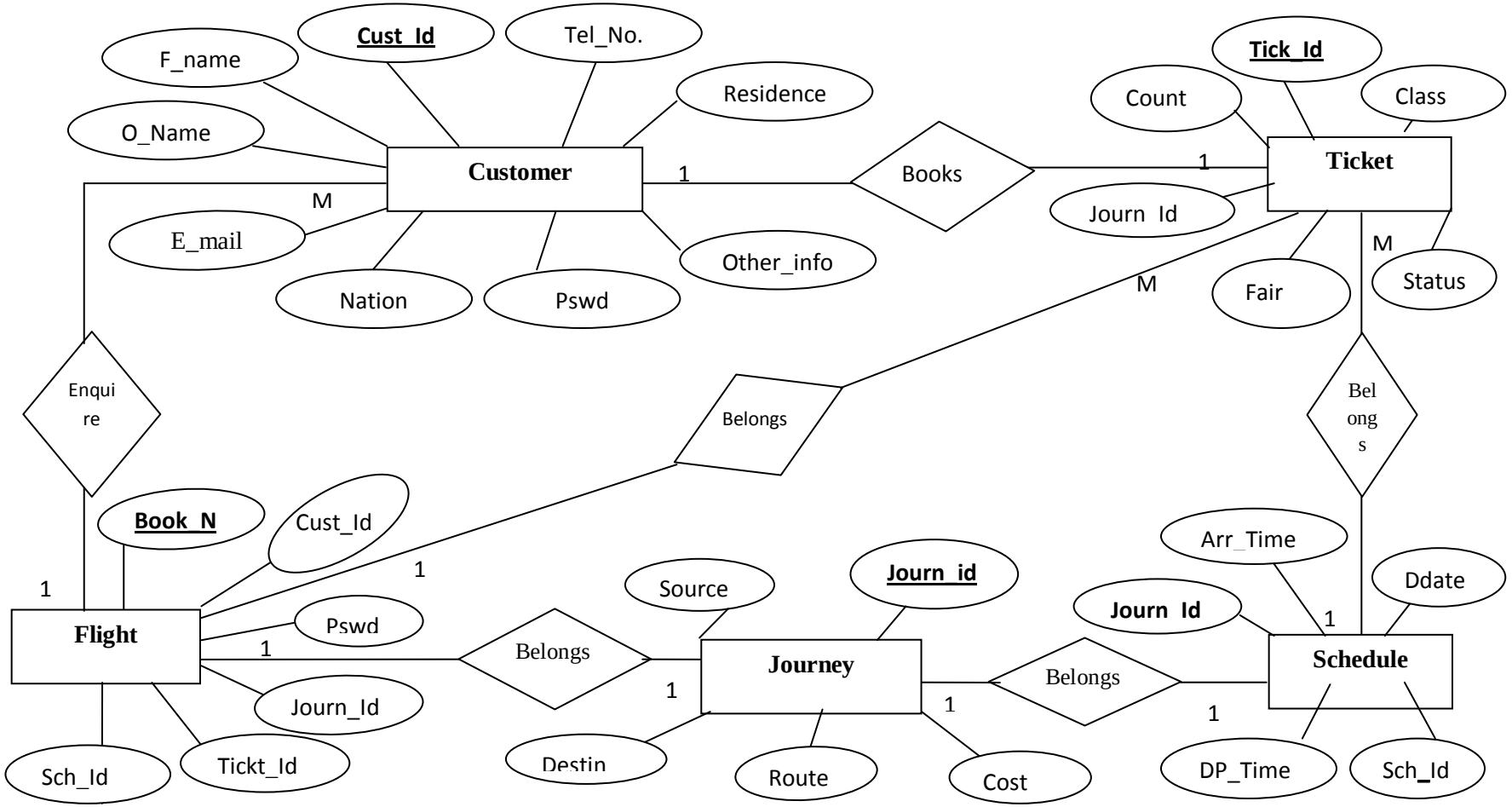


Figure 4.4 showing an entity relationship diagram for airline reservation system

4.7.4 Database Conceptual Design

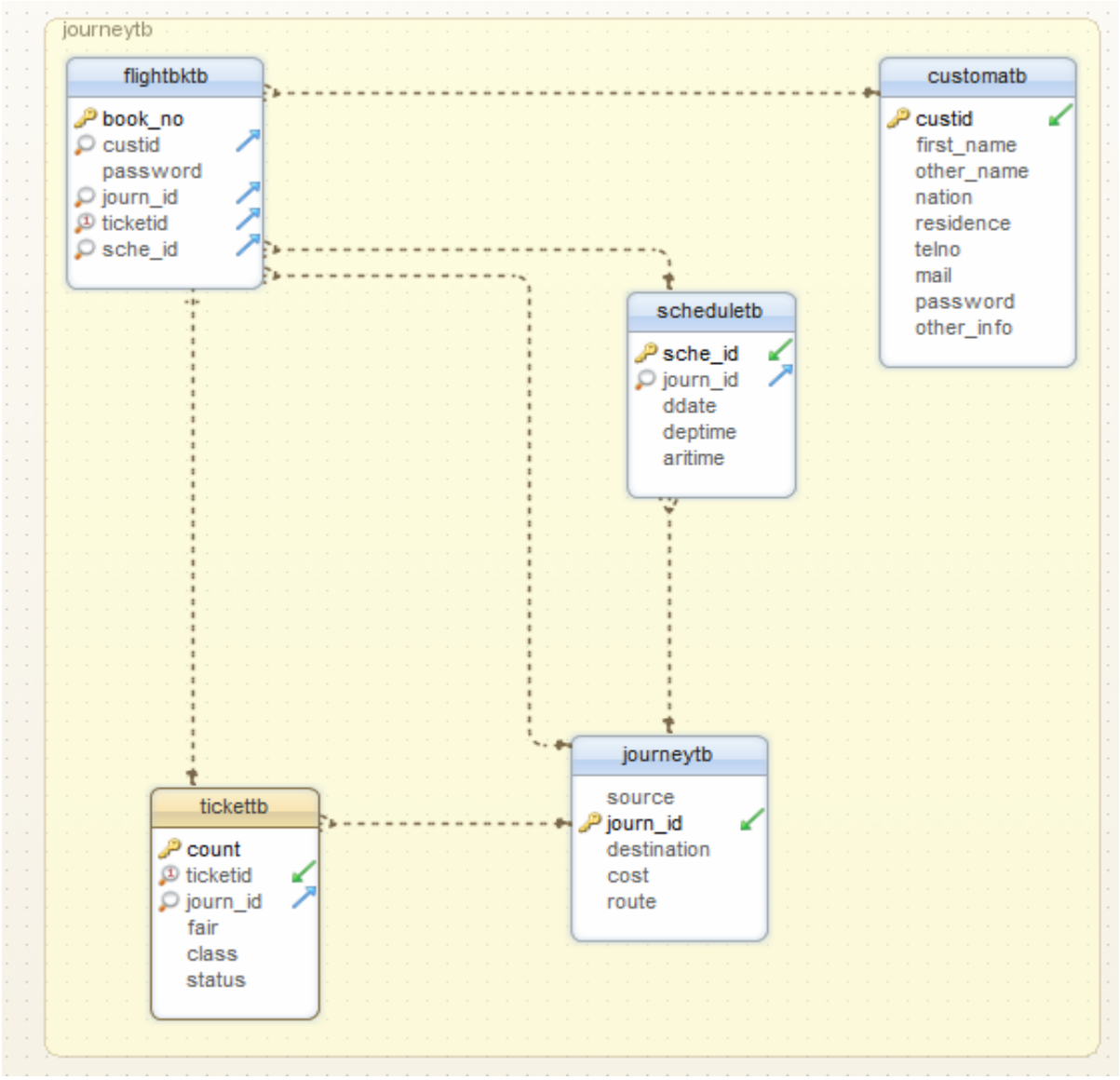


Figure 4.5 showing the data base logical design for an airline reservation system

4.7.5 Table Attribute Description (Physical Design)

Customer's table

Attribute	***Data Type***	***Description***	***size***
Custid (PK)	*int*	*Customer Identity*	*30*
First_Name	*Varchar2*	*First name of the customer*	*50*
Other_Name	*Varchar2*	*Other names of the customer*	*50*
Nationality	*Varchar2*	*Nation of origin*	*10*
Residence	*Varchar2*	*Residence of customer*	*12*
Tel-No.	*Int*	*Ticket identifier*	*8*
Password	*Varchar2*	*Customer's password*	*12*
Email Address	*varchar*	*Email Address of the Customer*	*100*
Other-info	*Varchar2*	*Any other information for a customer*	*250*

Table 1 showing passenger's details

Flight table

Attribute	***Data Type***	***Description***	***size***
Book_no (PK)	***int***	***Flight Identifier***	***20***
Cust_id	*Varchar2*	*Customer identity*	*12*
Password	*Varchar2*	*Customer Password*	*30*
Journ_Id	*int*	*Journey identifier*	*30*
Sche_Id	*int*	*Schedule identifier*	*30*

Table 2 showing flight details

Ticket table

Attribute	***Data Type***	***Description***	***size***
Count (PK)	*int*	*Ticket identifier*	*20*
Ticket_Id	*Varchar2*	*Ticket identifier*	*20*
Journ_Id	*Varchar2*	*Journey Identifier*	*20*
Fair	*Currency*	*Cost of the ticket*	*20*
Class	*Varchar2*	*Class of the Ticket*	*20*
Status	*Varchar2*	*Booked or not booked*	*20*

Table 3 showing payment details

Journey Table

Attribute	***Data Type***	***Description***	***size***
Journ_Id (PK)	*int*	*Journey identifier*	*10*
Source	*Varchar2*	*Where the Journey begins*	*20*
Destination	*Varchar2*	*Where the Journey stops*	*12*
Cost	*Currency*	*Cost of the Journey*	*100*
Route	*Varchar2*	*The points through which the Journey passes*	*100*

Table 4 showing journey details

Schedule Table

Attribute	***Data Type***	***Description***	***size***
Sche_Id (PK)	*int*	*Schedule identifier*	*10*
Journ_Id	*int*	*Journey identifier*	*20*
Ddate	*Date/time*	*Departure date*	*12*
Deptime	*Date/time*	*Departure time*	*100*
Arritime	*Date/time*	*Arrival time*	*100*

Table 5 showing schedule details

4.8 System implementation

The ARS provides the following types of easy-to-use, interactive, and intuitive graphical and telephonic interfaces.

- The ARS provides an easy-to-use, intuitive Graphical User Interface (GUI) as part of the Administrator's working desktop environment.
- The ARS also provide an interactive Graphical User Interface, on the World Wide Web for the general customers.

The system working scenario is as follows:

- The customer should register himself in order to proceed to book ticket service.
- The customer needs to input all the required particular details during the registration process.
- Upon successful login, the customer will be registered officially to the web service and he can login using his username and password.
- The guest is only permitted to check flight availability.

4.8. 1 System Users

Administrator

This is the person charged with responsibility of updating system content

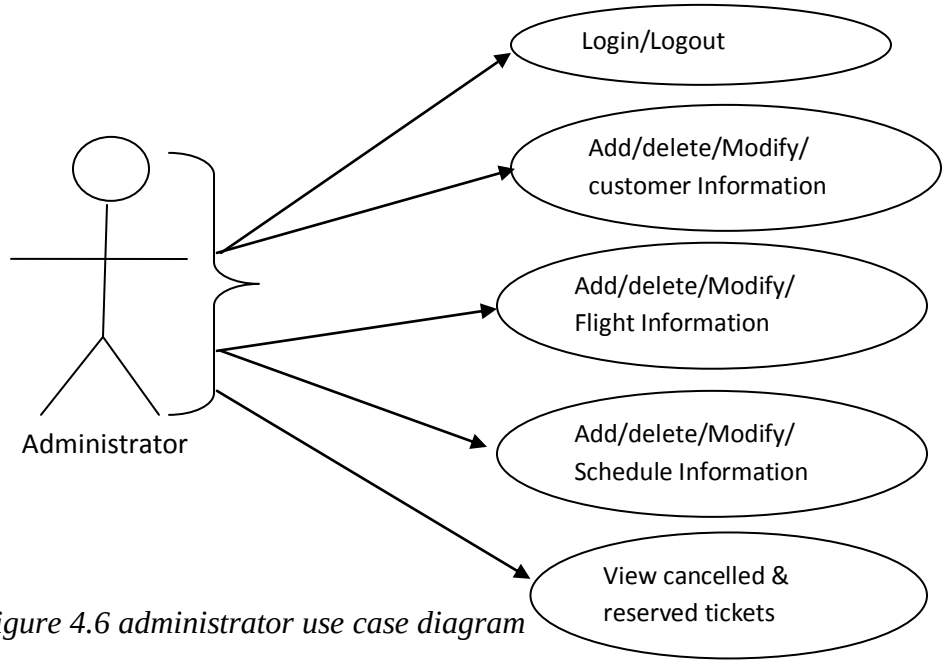


Figure 4.6 administrator use case diagram

Customer (Registered user)

The person who accesses the system from the user point of view

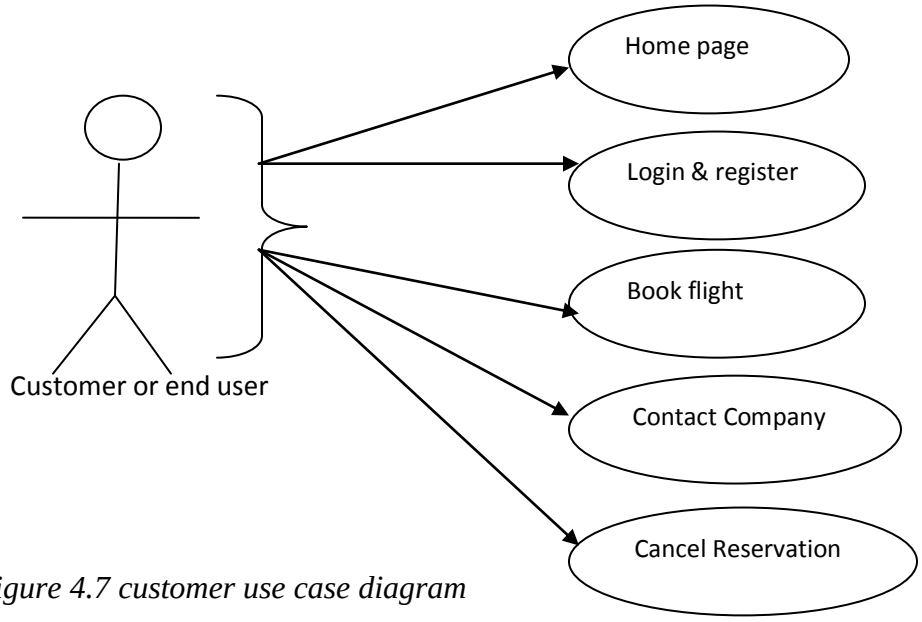


Figure 4.7 customer use case diagram

Guest User

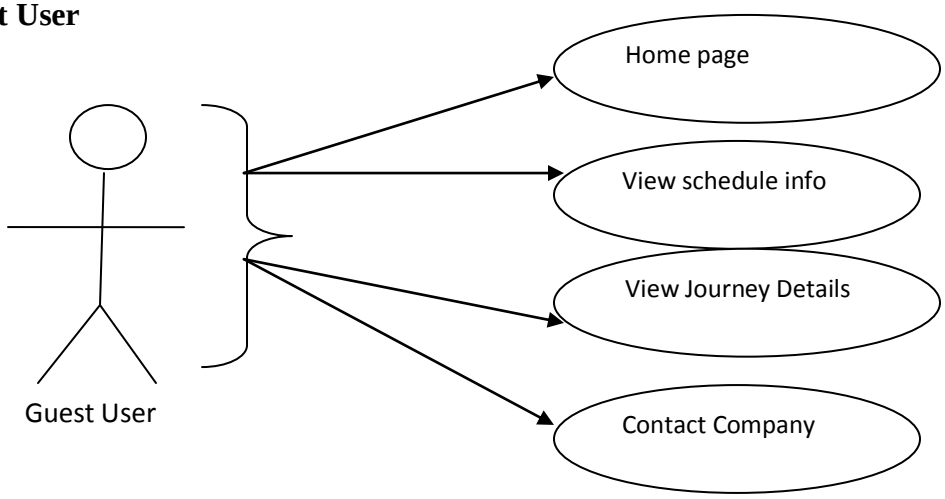


Figure 4.8 showing a Guest User case diagram

4.8.2 Implementation Requirements

The implementation requirements depend on the system specifications. These are the hardware and software requirements that the system runs on. The system supports all Pentium III clients and above computers, operating systems, Linux, Windows NT, Mac with 512 MB of RAM, at least 10GB of hard disk space and a 550 MHZ of the processor speed. The client computer must have internet connectivity to have access to the web server through TCP/IP.

The system should be installed on any server computer running on either Linux or windows architecture. The server should have at least 10 GB of RAM and I Terabyte of storage space and running on processor speed of at least 10 GHz.

4.8.3 System Execution Sequence

This is divided into two, User's environment and Administrator environment

User's environment

a) Welcome Page

This appears when the URL of Rwenzori Airlines is typed in any browser. While on this page customers can choose to register and continue to book tickets and flights or view flight schedules, journey details and access the contact us page. However for a user to book a ticket or a flight, he/she must be registered first.

Figure 4.9 Showing the Welcome Interface

b) Registration Form

This form is used by customers (Passengers) to register before booking a flight or ticket. The user must first register. To access this page the customer clicks on the register link on the home page. The customer Id and Customer password fields are mandatory, which means the customer must fill them before adding the record

Figure 4.10 Showing Customer Registration Form

c) Customer Search Form

This interface is accessed by clicking on **your info** link on the home page. On this interface the customer is required to enter his or her id and password to find his/her record. This record gives detailed information of what was entered during registration; it also provides any booking and flight information if any.

Figure 4.11 Showing the Customer Search Interface

d) Customer Search result Interface

This interface is as a result of a successful search for a customer record. This interface contains all the information that was entered during registration and any other flight, ticket, schedule and journey information in case the customer had already booked a flight. This interface is accessed by entering the correct customer id and password and clicking on find record

Figure 4.12 Showing a Full Customer Record Interface

e) Journey Interface

This interface is accessible by both registered and non-registered users to view the journey details. It's accessed by clicking on the Journeys link on the top menu of the system. While on this page both registered and non- registered users can view Journey details and for purposes of booking the users are required to note the Journey Id as it will be required in case the user wants to book a ticket and a flight. This interface shows the Journeys that Rwenzori Airlines will take on a specific day and date

Figure 4.13 showing Journey details Interface

f) Schedule details Interface

This interface is accessible by both registered and non-registered users to view the schedules for Rwenzori airlines on a specific date. It's accessed by clicking on the schedules link on the top menu on the system. While on this pages users are required to take note of the schedule Id as it will be required in case a user is to book a flight or ticket.

Figure 4.14 showing Rwenzori Airlines Schedules

g) Flight/Ticket/Cancel Form

This interface is accessed by clicking on flights link on the top menu on the system. This Interface is accessed by users who want to book ticket, flights and those who have already booked but want to cancel their flights. For purposes of booking the user must be registered and should have in mind the Journey Id for the Journey he/she wants to take as well as the schedule Id as this is required during booking

Figure 4.15 Showing flight Reservations, Ticket Reservation and Cancel Interface

h) Flight Booking Form

This accessed by clicking on Flight reservations on flights page/interface. This form is used by the registered customers to book flight, a registered. All fields on this form are mandatory hence the user is expected to fill all the fields

Figure 4.16 Showing a Flight Booking Form

i) Ticket Booking Form

This interface is accessed by clicking on the ticket Reservations link button on the Flights page. This form is used by registered customers to book and reserve tickets. All fields on this page/form are mandatory and hence the user is expected to fill all of them

Figure 4.17 showing Ticket Booking Form

j) Ticket Detail Interface

This interface appears after a successful ticket booking process. The user is require to note the ticket Id as it will be required during Flight booking

Figure 4.18 Showing Ticket detail interface

k) Ticket Cancelation Form

This form is accessed by clicking on cancel reservation button on the flights page. This form is used by customers who had already booked a ticket to cancel their ticket in case they want to do so. To achieve this customer will be required to provide his Id and Ticket Id that had been provided during booking

Figure 4.19 Showing ticket Cancelation Interface

l) Contact us page/Interface

This interface is accessed by clicking on contact link on the system menu. As specified in the project scope that the Rwenzori Airlines system will have a page dedicated to user quarries. On this page a customer or user whether registered on not can post anything for which he/she is not satisfied. Information sent here will be received by the administrator and presented to Rwenzori Airlines management for consideration. Fields with * are mandatory hence must be filled before the user cam post his or her comment

Figure 4.20 Showing Customer Contact us Page/Interface

Administrator Environment

This is restricted environment; it is used by the administrator to change system content. It's accessed by clicking on administrator link on the system menu. Access to this environment requires an admin password. Once the correct admin password is entered the person will have access to modify/ delete and all control of the system.

m) Admin Password Interface

Figure 4.21 Showing Administrators' Password Interface

n) Administrators Home Interface

This is the administrator's home interface; it's accessed when a correct admin password is entered in the interface above. Once on this interface the administrator can schedule flights, edit ticket information, change passwords, update journey details, schedule details, change database passwords and control every aspect of the system

Figure 4.22 Showing Administrators Home Interface

o) Change Password Interface

This interface is accessed by clicking on Password button on the administrator's home interface. This interface is used by the administrator to modify passwords. To modify the password the administrator must provide the old password and then feed in the new password

Figure 4.23 showing change password change interface

p) Database Interface

Used by the administrator to test configure and creates databases for the system. It's accessed by clicking the database button on the administrator's home interface

Figure 4.24 showing database interface

q) Add Schedule Interface

This interface is used by the administrator to add flight schedules in the system. Schedules added here can then available for booking by the customer. In here the administrator can add a new schedule or update an existing schedule

Figure 4.25 showing flight schedule interface

r) Journey Entry Form

This is the form used by the administrator to add journeys into the system. Journeys added here can then be available to customers for booking. This form can as well be used to update, delete and view journey and their details

Figure 4.26 showing journey entry form

s) Ticket adding form

This form is used by the administrator to add tickets to the system; Tickets added here can then be available for booking by the customers. It can also be used for viewing booked Tickets, update ticket information and delete tickets

Figure 4.27 showing add ticket interface

t) Flight Information Interface

This interface is used by the administrator to view booked schedules, Tickets, Journey and flights. This interface gives a record of what has been booked and what is still available

Figure 4.28 showing flight information interface

CHAPTER FIVE

FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter summaries the researcher's findings, conclusion and recommendations for the new developed system

5.1Findings

The researcher's findings are summarized in the following paragraphs below;

Today Airlines are under unprecedented pressure to produce economic results or perish as fuel, labor, and asset costs escalate and demand declines. The International Air Transport Association (IATA) reports that the airline industry lost more than US$9 billion in 2009. In fact, with the exception of a few years and a few airlines, much of the industry has not produced a return on investment that exceeded capital costs and this is as a result of use of traditional flight management methods still used by most airlines today

As the researcher found out with the industry poised for recovery, competition is expected to intensify as low-cost carriers continue to gain market share from full-service carriers by attracting both leisure and business segments. Reduction in business-class travel outpaces that of leisure travel by four to one and is a direct result of corporate belt-tightening and the emergence of travel substitution technologies, such as collaboration applications, high-definition video conferencing, and telepresence.

Adding to these challenges, new operating models, innovative entrants, and further airline consolidation will create new difficulties and intense competitive pressure for legacy carriers. In response, airlines are employing a narrowly focused near-term strategy including reductions in seat capacity and product unbundling (for example, paying extra for a window or aisle seat, or for more exit-row legroom) that could potentially have serious long-term consequences on customer loyalty, experience, and profitability from core products.

The researcher also found out that as global economies begin to show a sign of recovery, so, too, is the aviation industry. Industry wide opinion, however, is that business will not immediately return to pre-crisis levels. Notwithstanding anticipation of an economic rebound, some airlines are beginning to shift their strategies. Rather than fixate on saving the "sinking ship," airlines are repositioning their organizations to compete in the age of "the new normal" by seeking innovative, new service opportunities and business models. The future success of an airline will be decided, in part, by its ability to harness emerging technologies to deliver superior customer experience and engender loyalty while empowering employees and improving operational efficiencies. The timing could not be better: new products and innovations in mobility are emerging as one of the most promising areas for airlines to transform their business models and operations.

5.2 Conclusion

Before modern computing, the reservation system was done using manual means. This meant that a person about to travel had to spend a lot of unnecessary time waiting in queues in order to book their tickets. The manual process of reservation was also prone to human errors, which lead to a lot of dissatisfaction amongst travelers. Nowadays competition is so fierce between airlines that there are lot of discounts and a lot of luxuries given to customers that will give an edge to that particular airline. The online airline reservation automates these processes of booking airline tickets online, thus reducing the time wasted as well as the errors that are involved in the manual process. People will argue that online airline reservation system are expensive, and create unfair competition between other airlines that don't have them.

From the researchers view, online airline reservation is one the best innovation that has taken place in the airline industry and those companies that have not yet embraced airline reservation system ought to lose out, they may sight, additional costs, maintenance cost and the cost of development as their drawbacks but as Henry R. Luce (2001) [10], put it "Business, more than any other occupation, is a continual dealing with the future; it is a continual calculation, an instinctive exercise in foresight" World Wide Web and the Internet is here and airline companies for the future will seize this opportunity develop airline reservation systems and prosper

5.3 Conversion

The method of conversion will be parallel conversion where the developed system will be run in parallel to the current system. Those customers who can book on line can start doing so and those who can come to the airline offices can still book their ticket using the manual system. This will be done for a period of six months after which all the operation of the airline will be shifted to the online system

5.4 Recommendations

The researcher recommends the following about the system:

- The researcher recommends that the administrators and staff of Rwenzori Airlines be trained on how to use the system, thus enabling them to understand the functionality of the entire system.
- More research on this system is required to fully identify and eliminate some of the weaknesses and integrate it with banks to enable online payment
- There is need for the system upgrade as user's requirements change. User requirements differ with time, therefore, it is of great help for the system to be flexible enough.
- Other researchers can use this project report as a basis during future study of reservation system say in train reservation systems
- Owing to the ease and comfort of Airline Reservation Systems, local flights which are not on the system should be encouraged to compensate the system.
- The system should be made affordable so as to encourage consumers and travel agents on patronizing the system
- However much system access is protected by a username and a password, the entire computer system should be protected from unauthorized people to avoid misuse and damage of the system components.
- The users should carefully choose usernames and passwords so as to avoid security breach of the system hence they shouldn't have short passwords, using their friends or relatives' names as passwords.
- Backups should be done frequently to avoid data loss in case of hardware or software malfunction.

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APPENDICES

Appendix A: Interview Guide Questions

Name: …….

Section: ……..

Qn 1: How long have you been working with Rwenzori Airlines?

Qn 2: Have you ever heard of an online airline reservation system. If yes what is your view about it?

Qn 3: Have you ever used an airline reservation system?

Qn 4: How long does it take you to process a single ticket for a customer?

Qn 5: How is customer information stored currently?

Qn 6: How is flight scheduling done currently?

Qn 7: In the event of ticket cancelation how long does it take for the company to realize?

Qn 8: On a scale of 10 how would you rate the current system you are using in relation to those used by other airlines?

Qn 9: How are tickets reserved in the current system?

Qn 10: Comment on the current system in use

Appendix B: Questionnaire

Am Thembo Jimmy a student of Kyambogo pursuing Bachelors of Information Technology and Computing, am carrying out research on Reservation Information System as part of the requirements for completing the course. Am currently collecting data on customer satisfaction with the manual system being used by Rwenzori Airlines in scheduling and booking tickets. Please help me by answering the questions under listed below. Information provided here will be kept private. Thank you

Date of Travel: …….

Age……

Gender……

From: ……..

Destination: ……

Q1. How do you rate the overall service provided by the in-flight staff

1. Very good
2. Fair
3. Needs improvement
4. Very poor

Q2. Are you a regular traveller with Rwenzori Airlines? .....

Q3. How fast were you able to secure your ticket? ……..

Q4. Did the flight take off as scheduled? .....

Q5. Did you land in on time? .....

Q6. Were the air-flight attendants: (tick whichever is applicable) when securing the ticket?

Friendly? ☐ Respectful? ☐ Courteous? ☐ Welcoming? ☐

Q7. How available were the attendants to pick your orders or answer your questions?

Very ☐

Rarely ☐

Took time ☐

Available ☐

Q8. Would you travel with this airline again considering the services availed to you?

…….

Q9. Would you recommend the airline to a friend or family member?

……..

Q10. Did you think you got value for money aboard the flight?

……

Q11. What is your view about online reservation of tickets?

……

Q12. What recommendations would you make regarding service provision of the airline?

……

……

Thank you