

**COMPUTERIZATION OF AIRPORT OPERATIONS
A CASE STUDY OF FLIGHT ACTIVITIES
IN MINNA AIRPORT**

BY

**ATSEN, ISHAYA NYAM
PGD/MCS/2000/2001/998**

A PROJECT SUBMITTED TO THE DEPARTMENT OF
MATHEMATICS/COMPUTER SCIENCE, FEDERAL
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APRIL, 2002

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MINNA

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CERTIFICATION

This project work has been read and certified by the undersigned as meeting the requirements of the Department of Mathematics/Computer Science, Federal University of Technology, Minna.

PRINCE R. BADAMOSI
PROJECT SUPERVISOR.

DATE

MR L. N. EZEAKO
HEAD OF DEPARTMENT

DATE

EXTERNAL EXAMINER

DATE

DEDICATION

This work is solely dedicated to all those who have one way or the other played special role in my life. I salute you wonderful role. To God be the glory.

ACKNOWLEDGEMENT

My special thanks to God for seeing me throughout the program. It has not been easy but with determination to succeed, things became easier. In the course of this write-up certain individual played special and significant role.

Such as our affable Prince R. Badmus who is the project Supervisor.

Despite his tight academic work, he still created time, patience to offer useful suggestions and to make relevant corrections where necessary. To Daniel Bulus Kaze And Bassey Melody Ukwa for the corrections and typing of the project. I thank you very much.

To the Head of Department and other Lecturers in the Department. I salute your efforts always.

To all my colleagues, may God bless you all abundantly.

ABSTRACT

Computer Technology being the fundamental new technology of our age has continue to remain a very strong element shaping our world economy. It has facilitated the effectiveness of information technology (IT). It has introduced an efficient process of data management. The speed, accuracy, versatility, storability diligence and automation are the inherent characteristics. Due to these attributes bestowed on the computers, hence the need for direct changeover to this new system. Organizations worldwide have gone far in the utilization of this management science. It is therefore imperative that Airports should play a leading role because of the amount of data involve in all Airports operations.

Access to database resources requires programming techniques, which now is written in high-level language. The need to use the appropriate commands for the computer to understand and execute projects requires training. Simple data application as Dbase IV need to be acquired.

The project is therefore suggesting that, "...to enable a smooth changeover to the new system, application of Dbase IV will work well". It is user friendly.

Since Federal Airports Authority has been using manual methods of obtaining, processing and retrieving its data. It is being recommended that parallel changeover may be applied to the system.

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CHAPTER ONE

1 INTRODUCTION

The dynamism in technological advanced the world over can never be overemphasized. The move along this advancement is paramount. Information technology has continued to play a significant role enhanced by computer technology. Computers do not broaden our reach in the same physical sense that electronic communications do but also makes the power of infinite intelligence available and has advanced countries economies. Today, computers are in use in key fields of human endeavor, aviation in particular hence the need for computerization of Airport operations.

For Airports to keep abreast with this fast moving world on the one hand and for meeting the demand of users of Airport facilities on the other, Airport operations system require

To be computerized and these are:

Airside Operations,

Facilities Management,

Passenger/Cargo/Baggage Services,

Airport Administration,

Safety and Security Management,

Airport Information Technology Management, and

Engineering/Construction Management.

The inter-relationships between the data and business processes of the separate systems make the system a success.

The World fastest transportation system is vested in the Industry. All movement of goods and services from point A to point B by air have continue to grow. It is expected that by the year 2006 passengers will use the Airports world over. The figures will continue to increase with the advent of large and faster aircrafts in the global fleet as we are all aware and this transportation medium will continue to attract travelers because of the speed inherent in it.

It may result to queues or pressure being exerted on the Airport facilities. To minimize these problems, and to simplify passenger movement, hence the need for computerization. It may not begin at once in all the separate systems, but we may need to begin somewhere and move gradually, therefore this project intend to engaged itself on airside activities.

2 PURPOSE OF STUDY

It is beneficial to all operators in the Airport to keep their data and business rules in the most efficient manner for the purpose of sharing with themselves, with other Airports and in general with the Airports Council International (ACI). Doing just this will speed the exchange of experiences, obtain information, express themselves and defend their interest in the better efficiency. The issue of large movements of passengers is envisaged due to the available inherent speed in air transportation. The purpose of the study therefore could be look upon as follows:

- (i) to establish a new system concept that will facilitate a quick recording of all unit activities taking place at the airside;
- (ii) that such data resources should be kept in a most efficient manner for the purpose of sharing with other users;
- (iii) that those involved in the data collection and the management of the database should be trained, in other words, it will provide an opportunity for Airport Staff to be computer literate;
- (iv) that computerization of all Airport operations will enhance efficiency and thereby cause a shift from the present system to a new system;
- (v) that shifting from the present method (s) of gathering and retrieval of information will bring the Airports completely to the world of new information technology;
- (vi) the new system integration will facilitate a better decision making using the available control center;
- (vii) the project wish to involve the use of simple data operations like dbase iv;
- (viii) in general to give multiple customers, airlines, and a host of others access to a common set of data to supply or enhanced planning and scheduling;
- (ix) cut down operational cost and in the long run a simple network infrastructure is there to maintain;
- (x) to evolve a network from a pure cost center to a revenue generating tool;

- (xi) a well articulated relational database capabilities not only results in automatic verification of data – it also delivers the results efficiently that is what the future of this project expect to generate.

SIGNIFICANT OF THE STUDY

We should understand that Aviation Industry today is not merely for social services only but it is geared towards intensive commercial purpose that is now shaping the economy of countries the world over.

To compete favorably within the nations markets and those outside its borders, there has to be on ground a careful study and documentation and storage of all economic activities of the Nation for a speedy access. We require such data/information now as foreign investors are asked to invest in the Nigerian economy.

Judging from the present trend of use of information technology (IT) no Airport organization or persons operating in it is left behind in this business in particular developing our own businesses faster.

If these networks are openly coordinated i.e., will improve air transport, facilitate easy passenger transfer, coordinate related businesses and business rules of all operators, with the increasing daily pressure from these users hence the need to fine-tuned the overall performance, with the introduction of computer base management through database resources.

Fine-tuned by ushering-in use of computer is a step forward, by satisfying and ultimately exceeding customers expectations.

The study is therefore significant because, by introducing high-tech, useful information data is away of letting the flying public to use your good services. It is significant because the networking as a communication system is an important tool for a terminal management team.

The network models become a useful efficient tool to use for an Airport. It may be a turning point for all operations in all Airports in the Federation.

The timing is adequate as to enable Airport operations in our Airports measure up with that of our counterpart in Europe, America and elsewhere.

Significant because of the major re-structuring going on in the industry. There are new business approach and these will require different management skills particularly now as emphasis from mere operations data usage to marketing and commercial development. This project is significant because there is increase competition between the various modes of transportation and to facilitate these hence the need for computerization skills, significant, because it will be the first time the network system is being thought for implementation at Airport in Nigeria and this is expected to reduce cost of operations.

4.0 METHODS OF SEARCHING FOR INFORMATION

There are several methods of gathering data or information, these methods include: Observations, record searching, special purpose records, sampling, questionnaires and interview

4.1 RECORD SEARCHING:

This has to do with establishing quantitative information i.e. on volumes, frequencies, trends rations. This method help to enable you establish how much reliance can be put on the estimates given by the staff or the management of a department, help in indicating whether departmental objectives are actualized or not and whether information needed for decision making is available when required.

4.2 SPECIAL PURPOSE RECORDS

Sometime the most exiting records may not give you the required information and the only way of obtaining this reliable information is to install for a given limited period a

special purpose records. The missing information is likely going to be quantitative and which may concern with volumes, frequencies trends or rations or, may relate to management

4.3 OBSERVATION:

This involves watching an operation for a period of time to observe for yourself exactly what happens. The technique is particularly good for training bottlenecks checking facts that have already been noted and generally apply a “seeing eye to the job”

4.4 SAMPLING METHOD:

This implies taking unbiased selection from a population. Using the selection to draw a conclusion on the population. How many people are there in a household in Minna Town. Sample of household can be selected at random to be processed. The result of this could be used to draw a conclusion to the number of people in a household in Minna Town.

4.5 INTERVIEWING:

This is one of the most satisfactory ways of obtaining information i.e. information about objectives, constraints, allocation of duties, problems and failure of the existing system. In the interview, introduce yourself briefly and clearly, highlight the purpose and scope of the study you are undertaking, bring specific and direct question about procedures that would let your improving the system, limit and amount of note taking to minimize detracting the person being interviewed, at the end you summarize the information gathered and suggest ways of following up.

4.6 QUESTIONNAIRES:

This is where the required information about the nature and volume of work in an office is needed. A questionnaire can be used to provide uniform responses to standard questions. The design of questionnaire takes careful preparation, testing and evaluation.

To prepare a questionnaire you must take into cognizance;

- (i) The group being surveyed.
- (ii) Your introductory materials should be written clearly so that respondents know the purpose of the study how the data will be utilized.
- (iii) Determine what facts needed to be collected.
- (iv) Questions should be clear to easy understanding by the respondent.
- (v) Determine the method of data analysis to be used.

- (vi) Administer the questionnaire, follow up to encourage that they are returned and analyses the result.

Though every technique of obtaining data/information has its shortcoming. This project intends to use record searching and observation. The record searching method will avail, the individual records/information required of the operational relationship of activity commonly performed as being demanded by the public. Observation will further enhance the workability of the computerized functions for the purpose of obtaining proper relational confidence and efficiency of database.

SCOPE AND LIMITATION:

Computer technology is fundamentally a new technology of our age. It has a very strong potential of contributing to new break-through in at least basic improvements in transportation modes. In many parts of the world where this technology is being used in Most of their businesses have offer for the first time the possibility of changing from extensive area to intensive area of development in the transportation systems.

The extensive application of computers in say urban transportation systems suppose to lead to a new level of transportation service to an increase capacity, to decrease in operation costs, decreased impact on energy reserves and environment, and a new standard of safety. While the intensive development of transportation systems will come only through broad base studies and investigation into each and all of the components of the transportation system. The computers have the capacity to receive, store and process data in unlimited number of ways due to its good amount of (electronic) memory and processing power or speed. A computer has speed accuracy; versatility, storability diligence and automation inherent in it make it a worthwhile technology to be relied upon.

In the airline industry computer s are used to control crew, equipment, traffic, and maintenance of scheduling as well as handling reservations, slot time, staff management etc. In the Nigerian Airports system the new technology is yet to secure its proper place. It is in this vein that Government in their wisdom encourage computer education in Nigeria. Airports require the availability of information technology (IT); the technology is being enhanced by use of computers. Computer technology is much needed in all facets of operations. In particular

needed for systems integration. Systems integration requires careful identification of all related units or answers.

Dr Hsin, Vice President, Aviation International, put it in the 1998, Magazine that “Airport system integration can increase efficiency and lower operations cost”. Computer system software i.e. the “middleware” that facilitates systems integration most familiar to the Airport personnel are the commercial off the shelf (COTS) applications that are dedicated to specific Airport functions. Example passenger checking systems, flight information display systems, building management systems and cargo handling systems. These categories can be subdivided into units’ operational subsystems. For Airports to be called modern Airports, it must have collection of business areas.

These high-level business areas can be further broken down into more detailed business area functions. Example, Apron control, apron services, building management, cargo handling flight information display, aircrafts/passenger statistics and each business area may usually employs a computer system (often COTS products).

Events or information, which will be useful to more than one system, are candidates for integration. To address the issue of “How” Hsin, in addressing the “How; considers the availability, maintainability, evolve ability, extensibility, scalability and interoperability of the overall integrated systems”.

The project intends to use Hsin strategy in the integration of the systems. I.e. the design of the physical architecture of the overall integrated system, it will include the distribution and storage of the data and the distribution of the overall airport business rules must be considered. There must be a decision as to where the Airport business rules are to be implemented. To do this three models are to be considered.

- (1) First model: all data and business rules are considered shared and are stored on a central database and central application server.
- (2) Second model: all shared data and business rules are stored centrally, while the individual systems stored non-shared data in their own local database and implement their own business rules.
- (3) Third model: all data and business rules are kept in the individual systems and replicates shared data and common airport - wide business rules in a central database and application server.

In deciding which model is best suited for a particular Airport, consideration must be made of:

- (i) Ease of central database model development and maintenance;
- (ii) Ease of integrating COTS subsystems
- (iii) System efficiency and throughput;
- (iv) Overall integrated systems availability.

Each of these models has their own advantages and disadvantages. For the first model Airport that tried this, found great difficulty in developing and maintaining their shared data model. The second model much preferable than the first still it has a draw back of making the integration job harder since individual subsystems must be heavily modified. It has reliability and performance problem as the subsystem must rely on central servers for mission critical data and function ability. The third model is most Airport systems, systems level integration is the concept appropriate, it is called system-level integration, has significant advantages for integrating of allowing each individual integrated subsystems to continue to run essentially stand-alone, using its own local data storage and business rules. In a nutshell, the system-level integration model has proven to be very useful in allowing Airport and other organizations maximum useful integration and high reliability with minimal cost. The project will limit itself to some airside activities integration. Using available records from the Airport. The basic airside activities are:

- (i) flight information, such as arrival, departure type of aircraft, disembarking/embarking passengers code shares etc.
- (ii) baggage information such as destination, weight, flight code etc.
- (iii) ramp tarmac information such as inbound and outbound flights.
- (iv) Gate information situations such as need to get passengers on the best available alternative flight.
- (v) In-flight services.
- (vi) Video: like those placed at the concourses, apron for surveillance including the CCTV, etc.

The careful and proper integration of all these subsystems into a single database will allow users of all sorts of information get access. They will be able to use their various query languages to obtain the information they desire. As we say, the interrelationships between the data and business process of the separate systems make the system a success.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

BACKGROUND OF THE STUDY

The recorded flight ever known took place in December 1903 in North Carolina United States of America. This flight carried a single passenger (the pilot) for a distance of 260 Meters. Since then, the aviation has developed into a global industry with over a billion Passengers flying nearly 14 billion kilometer annually (1993 figures). By 2006, it is estimated that over two billion travelers world wide will pass through airports each year and by 2012 it is estimated to be twice these figures.

The civil aviation industry started in Nigeria in 1936, 33years after the recorded flight at North Carolina USA. The industry is as old in Nigeria as in most of the developed countries. The book “Aerodrome plans and particulars as at September 1, 1914” written by H.E.Walker C.B.E, MICE, Controller of civil aviation, 31 Airports were listed as existing in Nigeria that Time. The Airports were:

Agbabu (Ondo Province)	Lokoja
Apapa	Maiduguri
Azare	Makurdi
Bauchi	Mamfe
Benin	Minna
Bidda	Nguru
Calabar	Oshogbo
Enugu	Port Harcourt
Gusau	Potiskum
Ibadan	Sokoto
Ikeja	Tiko
Ilorin	Yelwa
Jos	Yola
Kaduna	Zaria.
Katsina	Bida
Kano City	Nguru
Kano South	

The Control officers were either provincial Engineers, Superintendent of police, District officer, Local Government Administrators or even non commissioned officer at the head of the troops. Though the number of Airports were many, the airport definition goes beyond what was called Airports then, most if not all were just airstrips.

The proper civil Aviation industry in Nigeria came into being when Mr. E.H. Coleman arrived to assumed the post of director of civil aviation including British West African Colonies in 1950. The department of civil aviation (before 1950) was as follows:

- (i) The controller of civil aviation, which his primary assignment was the director Of public work.
- (ii) Operation officer Grade I deputy director of public works.
- (iii) Operation officer Grade II
- (iv) 2 air traffic control officer Grade I
- (v) 7 air traffic control officer Grade II

All these category of workers were referred to as senior service officer. In 1950 the airstrip manned by 12 senior service officers and 40 junior service personnel totaling 52 officers. The controller and his operation officer worked in Headquarters.

There were a total of 28 aerodromes. These were divided into 4 categories:

- Grade I:- The international Airport of Kano and Lagos.
- Grade II:- Aerodrome of Maiduguri and Port Harcourt used regularly by National Traffic and occasionally by international traffic
- Grade III:- Aerodrome used by National traffic
- Grade IV:- Aerodrome used only occasionally and emergency landing grounds.

The 1950 annual report of civil aviation declared in 1951 “senior officers of the department with the ranks of Airport Managers were in charge of Kano and Lagos Airports. These officers were responsible to Headquarters for implementing policy and the administrative and executive function in connection with general operation of the airports. At all the Grade II and several of the Grade III Aerodromes. Junior officers appointed to provide information on air traffic control service and to coordinate local aerodromes facilities and requirements in cooperation with the authorities concerned. These were the air traffic controllers. During these period there were not clear

distinction of duties of airport operators. Whether you've AIC personnel or airport operators you were the same. i.e. they were performing the function of the airport operators and traffic control. Their duties include: traffic control Maintenance of the Airport, collection of statistics and airport planning. These combinations of duty of both Airports administration and air traffic control development principles and planning called for definition or separation of duties into two bodies. We i.e. airport administration and Air traffic control.

In 1976, therefore through decree 45 created the Nigeria Airports Authority (NAA) and Federal civil aviation authority (FCAA) for the former Ministry of civil aviation. The functions of NAA were to take over the management of all government aerodromes managed by Aviation division, and the provision of ground handling services provided by the Nigerian Airways to the Airlines. FCAA to take over the development and provision of navigational aids, telecommunication facilities, and air traffic control services and functions such as Aircraft registration, air worthiness of an average operational safety and licensing .

April, 1976 Government approved a draft agreement with the Dutch Royal Airport Consultants, Messrs Bewenschot Noret Bosboom BV, for the provision of consultancy services for the establishment of the Nigeria Airports Authority. They reviewed and re-evaluated the major changes that have been in place in our Airports since the main report was written in 1972. After visiting all the Airports to ascertain what was on ground they submitted a report, which provided the framework for the implementation

of phase one of the project.

Phase one was the setting up of the following:

- (i) Technical branch
- (ii) Accounting and finance branch
- (iii) Personnel branch
- (iv) And Airport Management at Ikeja – Lagos.

The phase two was executed along with phase one to hasten development of the Airport and commencement of flight operations in all Airports.

In 1995, NAA/FCAA were merged together again for enhancing speedy and efficient development and management of the Airports. The two merged together formed the Federal Airports Authority of Nigeria (FAAN). In 1999, FAAN formed an Agency known as Nigeria Airspace Management Agency (NAMA). Nigeria now manages twenty Airports excluding the one in Port Harcourt managed by Shell Group. Others include sixty-four Airstrips located across the Country. States or some Private Companies owns all Air Strips.

Nigeria became a member of the International Civil Aviation Organization (ICAO) in December, 1960 upon attaining Independence. This Organization was formed in November, 1944 in Chicago with fifty-five Nations invited to attend. The conference was to consider or to organize Civil Aviation in a manner to serve the people of the World safely and to promote peace and economic development, fifty-two States attended. In 1994, membership of the organization has risen to (183) member State. The ICAO as a sovereign body the assembly (of members states) and a governing body – the council. The Council is a permanent body composed of (33) members drawn from contracting states and is responsible to the assembly. The Assembly meets once in three years and elects Council Members for three years term. One of the major duties of the Council is to adopt International Standards and recommended practices and to incorporate these into the annexes to the convention of which there are (18) present (1994). The council may act as an arbiter between contracting states on matters concerning Aviation implementation of the convention. It may investigate any situation, which presents avoidable obstacles to the development of International air-navigation and may take whatever steps are necessary to maintain the safety and regularity of operation of International air transport. The Council Headquarters Is in Montreal Canada.

The general basic objective of the Airport policy is to assist the progression of the modernization of this sector to improve the infrastructure and administration of the system for the advancement towards greater economic rationality. This will lead to the stimulation of the private sector participation in both investment and infrastructure management, equipment and Airport services for

commercial use. This will undoubtedly lead to the strengthening of National integration, International competitiveness and the productivity of National economic and development.

The vision and mission of FAAN is towards the attainment of these objectives guided by policy and principles. Airport policy and principle may be thought of on the basis of pricing of air transport accordingly for air competition and towards major integration between various means of transportation, infrastructure development, modernization of management of Airports operational scheme, incorporation of private enterprises, encouraging regional air transport network and the incorporation of future concepts of navigation for the purpose of far reaching technological advancement.

THE DECREE/OBJECTIVES

The objectives of establishing Federal Airports Authority of Nigeria (FAAN) are clearly spelt out by the decree, which established it (decree No. 45 of 1976). The objectives include the provision of efficient social services, safety generation of revenue through activities relating to Aviation and positive contribution towards development of Aviation Industry and the Country in general.

In the quest to achieving greater development height the Airports Industry has undergone many changes i.e in 1976, created from the then FCAA to be known by the decree as Nigerian Airports Authority (NAA). After several years, in 1996 by decree no. 9 of that year it became Federal Airports Authority of Nigeria (FAAN). And by 1999 an Agency was carved out of FAAN known as Nigeria Airspace Management Agency (NAMA) decrees No.48, commencement date of 26th May, 1999.

With this development, a new FAAN was created. A Federal Airports Authority of Nigeria with a vision “to be among the top 50 Airport groups in the World by the year 2010”. In achieving this vision, Federal Government and FAAN are determine to make Murtala Mohammed International Airport a hub of Aviation activities in Africa. In realization of these laudable objectives, “it is critical at this point to note that we are returning to the International fold to ensure the availability and functionality of facilities at the Airport and that our Airports

Furthermore, the objectives affirmed that the domestic Airports must be maintained On the same International level with very high standards.

The mission statement: “develop and profitably manage customer-centric Airport Facilities for safe and efficient carriage of passengers and goods at world class Standard of quality”. The discriminating competencies are:

- (i) World Class infrastructures maintenance and management,
- (ii) Customers service excellence and
- (iii) Cost leadership

The main objectives of establishing Federal Airports Authority of Nigeria (FAAN) are clearly spelt out by the decree that established it. So also the vision and the mission of the pursuing the objectives are clear.

Aviation Industry is capital intensive worldwide. Today Airports are under increasing pressures to manage their operations efficiently and run their businesses in a more profitable than just cost recovery. In Nigeria today, the issue of privatization and commercialization is to increase the efficiency of businesses in a more profitable manner. The demand for improved infrastructure requirement increased daily.

Aviation industry experts estimated that construction market for new expanded or renovated Airport airside and landside facilities will remain strong for the next ten to fifteen years says Evan Futterman in his article “Building boom” (1999) that “Airports must become fundamental infrastructures in a region through implementation of development that are suitable and sustainable for the ecosystem”.

Bruce Albinson et al their contributions to Airport development assert that “The world Airport have the ability to provide the highest quality concessions and exciting retail environment equal to or surpassing those found outside Airports”.

Nigeria today has twenty Airports. The organization is therefore confronted with strong issues of building new terminals like that of Abuja cum Lagos. It is also faced with expansion or renovation of the existing Airport under it. Most Airports in Nigeria were built as part of National plan to open up every part of Nigeria significantly to air-travel for economic development and easy administration; it was not purely for commercial purpose. In this vain, some of the Airports now are under-utilized resulting to low revenue even at the expense of assets of FAAN

which worth over ₦42 billion in 1996. The under utilization of the Airport viz aviz low passengers patronage contributed immensely to the weakness of the Authority. But proper tariff fixing and monetary will alleviate much of the slowness of the its revenue generation to improve it weak capital base taking into consideration in vast assets.

The Airport to a large extent at the past, depended much on the ability of the Federal Government funding its operations but by decree 25 of 1998 till now emphasis of Government is to allow these organs to generate their revenues internally not to depend on the Federal Government. Instead of receiving subventions from government, these organs should pay certain percentage of their revenue to the coffers of the Government a remarkable addition to the past policies. Decree No. 25 of 1988 had categories of Government enterprises into either fully privatized or commercialized and partially privatized or commercialized. FAAN was in the category of partially commercialized Government enterprises but in line with its objectives as a social service provider capable of generating its internal revenue to cater for its operations. Though the origin objectives for which it was set up remain obligatory new objectives with emphasis on economic indicators added to it. In performing its roles the organization takes into cognizance of the International Civil Organization (ICAO) standard and recommended practices which Nigeria is a signatory. ICAO is the regulatory body of all Airports standards worldwide. A member of Airports Council International (ACI). As the Airport uses of its facilities pay for the cost provision and running of Airports, Board and Management of the organization is giving free hand to manage the affairs of it.

For efficient and effective management, FAAN as an organization has been divided into six directorates: Administration and Supply, Finance and Budget, Medical Services, Airport Operations, Engineering Services and Commercial/Investment. The Directorates are headed by Directors who are to report to the Managing Director/Chief Executive (MD/CE). The Directorate of General Manager, Deputy General Manager and Assistant General Managers. Each Directorate has Department under it which all work hand in hand to ensure smooth running of its operations for the attainment of excellence.

For the attainment of excellence, their principal function of the Authority has to be pursued vigorously. These are:

- (i) To develop and maintain Airports and all necessary services and facilities for safe operation of Aircrafts and telecommunication facilities.
- (ii) To provide accommodation and other facilities for the effective handling of passengers and freight.
- (iii) To develop and provide facilities for surface transport within Airport.
- (iv) To carryout at Airport (either by itself or by an Agent or in partnership with any other person) such economic activities as are relevant to Air transport.
- (v) Generally, to create conditions for development in the most economic and efficient manner of air transport and Aviation

With these basic functions over the years since the establishment of FAAN, now there are strong indications of commercializing completely and when that level is reached there shall definitely be a review of the present objectives which will look more on economic indicators rather than more social services. There are greater awareness among Airport Managers to making Airports large economic hubs.

like Eurf Thomas, Commissioning Editor of International Airport Review Magazine Said “ The Commercialization and Liberalization of civil Airports are making Airport Managers more aware than ever of the close links that exist general fluctuation in Economic trends.

Management teams have to use their own knowledge, education and experience to develop strategies to deal with legacy business processes and systems.

The single most strategic element, which will have greatest effect on efficiency and effectiveness of the Airport in its totality is the communication system; therefore the need for network installation. This must support, integrate and give access to all the systems.

System integration can follow either cross-application or intra-application networks integration. Allowing Airport (enterprise) wide access to these systems is normally the first step and can result in a major improvement in service levels and efficiencies.

Like recording schedule and unscheduled flight movement from May 21, 1999 to July 31, 1999. The significant attributes as Date, Operator, Aircraft Type, Registration Number,

Arrival, Departure, Souls on Board in and Souls on Board out, time of arrival or departure. When these are obtained such data help in the projection of passenger and planning for the future. These projections help in the revenue generation and capacity utilization. The operational database forms the hub of the entire network for which all other users systems draw their data.

Ray Moss et al; supports that “exchange of data is the essential ingredient Airport need to enable them design for the future as well as operate efficiently in the present..... People and technology barriers have made Airport information coordination impractical”.... He continued and said” Infrastructure already exist” individual subsystems have existed as Islands of intelligence within the Airport for sometime. It became pre-existing Islands and data centers. Airports have most of the necessary substructure in place to make efficient use of a networked for data-management. There should be a system to system network. That is number of systems need to communicate or share data with each other in order for a boarding process to proceed smoothly.

Benefiting revenue recognition. This will be facilitated as the open network development allows linking of systems that can result in mutual benefit to Airport, Airline, Passenger and others. The success of networking depends largely on the success of database resources. Terminal system performance includes passenger characteristics and growth assumption, passenger processing and flow performance criteria and others like environmental schedule gives the simplest assessment of the overall terminal complex performance i.e., as system performance; sub-system function; operational results.

The ability to operate Airport facilities using fully integrated system that process and track passengers, baggage's, aircraft, concession revenues and other resources is integral to an Airport's operation, time is more than money for airline and Airport, when it comes to processing of millions of peoples, tons of cargo and thousands of aircrafts. These require high tech computer system. If all Airports in Nigeria, airlines, and concessions begin to go database in their management of data and business processes, the result will be effective and efficient management in the Aviation Systems. There will also exist a gradual shift from the present system to the new system of evolving business decisions.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN:

3.1 INTRODUCTION:

System analysis and design in a computer system having to do with the user, the hardware and the software. It has a goal for solving problems for the user. It is concern with man-made systems involving inputs processes and outputs. A system can be regarded as a set of inter-acting elements responding to inputs to produce outputs.

3.2 FEASIBILITY STUDY:

Is a study conducted in order to establish how best the derived solution will fit in, how workable it will be in the new environment. Feasibility study prevent unnecessary time wasting, effects and also use of other resources.

3.3 PROBLEM WITH THE EXISTING SYSTEM:

The existing system is manual. It is slow to obtain results.
It is slow to obtain results.
Lost of information very high.
Difficult for decision making.
The method of data collection is cumbersome.

3.4 BENEFITS OF THE PROPOSED SYSTEM:

No lost of information.
The system is computerized with adequate data relation.
Information can be obtain within a short time limit.
Obtain information is easy, is user friendly.
It is effective and efficient for decision making.
There is confidence in the application of data due to the independency of the data-structures.

3.4 TESTING PROJECT FEASIBILITY:

It is a process of coding, testing and documenting program, in the system. It involves development of quality assurance procedures including data security, backup recovery and the system controls. The program is tested with both live data or artificially generated.

3.5 CHANGE OVER PROCEDURE:

The change over from the old to the new system will be a gradual one. The change will occur when the system has been proved to the satisfaction of the systems analyst and other implementation activities completed. The user managers are satisfied with the results of the system tests, staff training and reference manuals. The changeover is achieved in a number of ways ie direct, parallel running, pilot running and stage changeover.

3.6.1 DIRECT:

This is where the old system is completely replaced by the new one.

3.6.2 PARALLEL RUNNING:

Here processing current data by both old and new system until the new system has been proved for at least one system cycle. Its main disadvantage is the extra cost, and the difficulty of user staff having to carryout the different clerical operations for system old and new.

3.6.3 PILOT RUNNING:

Data from one or more previous periods for he whole or part of the system is run on the new system after results have been obtained from the old system.

3.6.4 STAGED CHANGEOVER:

It's a series of limited – size direct changeover; the new system is introduced piece-by-piece. A complete part or a logical section is committed to the new system, which the remaining parts are processed by the old system. Only when the selected part is operating satisfactory is the remainder transferred. This reduces the risks involved in a direct changeover and enables the analyst and the users to learn from mistakes made as the changeover processes. Its disadvantage is that it creates problems of controlling the selected part of the old and the new systems, and it tends to prolong the implementation period.

3.7 COST-BENEFIT ANALYSIS:

This is necessary to determine the economic feasibility of the project whether it is economically worthwhile to invest in the project. This project intends to use three computers. One will be positioned to record all International flights and will be located at he International Wing and the second one takes care of all domestic flight oerations. The theird will be placed at cnter in the Office of Statistics. This Office is the collation center for all flights information.

<u>DESCRIPTION</u>		=N=	:	K
2 Computers	-	130,000		00
1 complete with a printer	-	160,000		00
3No. UPS	-	45,000		00
Staff Training	-	160,000		00
Maintenance	-	30,000		00
Electricity	-	25,000		00
Software program	-	60,000		00
Consultancy	-	100,000		00
Cables	-	65,000		00
Back-ups	-	50,000		00
Standby arrangements	-	150,000		00
Other consumable materials	-	50,000		00
Insurance/Telephone/Power	-	48,000		00
TOTA	-	<u>1,063,000</u>		<u>00</u>

3.7.1 BENEFITS:

Benefits that will be derived from the installation of this system is immeasurable. The wish of the project is within a short possible period the organization should go database and possible integrated into the world website.

CHAPTER FOUR

4.0 SOFTWARE DEVELOPMENT/IMPLEMENTATION

4.1 INTRODUCTION:

Software are basically programs. Without the software, the hardware will not be put into effective use. The software is also implemented. Implementation includes all those activities that take place to convert from the old system to the new one.

4.2 CHOICE OF LANGUAGE:

The language used in programming is Database Management System IV. A Database Management System is on Software that constructs, expands and maintains the data contained in database. It provides the interface between the user and the data in such a way that it enables the user to record, organize, select, report on and otherwise manage data contained in the database.

A database can be defined as a mechanized shared and centrally controlled collection of data used in an organization. It is any collection of useful information organized in a systematic and consistent manner. A database where data are stored.

4.3 FEATURES OF THE CHOSEN LANGUAGE

In data processing environment, data are view as a whole irrespective of their type. Furthermore, the integration of data of different types are linked by logical relationship through a Database Management System. The features of DBMS are as follows

4.3.1 DATA INTEGRATION:

In a database, information from several files is co-coordinated, accessed and operated upon as though it is in a single file. Logically, the information is centralized; physically the data may be located in different files.

4.3.2 DATA REDUNDANCY IS ELIMINATED:

Data redundancy occurs when the same data appears in more than one file. This leads to wastage of storage space and duplication of efforts during data entry. DBMS eliminates data redundancy since data are not duplicated in files.

4.3.3 DATA INDEPENDENCE:

DBMS ensures data independence because application programs are isolated from the physical or logical storage of data. This feature seeks to allow for

changes in the content and organization of physical data without re-programming of application.

4.3.4 DATA INTEGRITY:

This is an important feature of DBMS. Since data is stored once without duplication, the information retrieved is consistent as only one update is enough if there is a change in the data.

4.4 ADVANTAGES OF DATABASE MANAGEMENT SYSTEM:

- (i) It is suitable for transaction processing application.
- (ii) It is easy to use and understand
- (iii) It is easy to develop user-friendly application hence; data entry and updating can be easily performed.
- (iv) It is easy to make corrections.

4.5 HARDWARE REQUIREMENT:

Equipment cost (the pheral devices, capital costs of computer). Installation cost i.e. computer room, software consultancy/changeover cost, personnel costs i.e. of staff recruitments/relocation, staff salaries, allowances and pensions, redundancy payments, overheads; operating cost e.g. consumables (tapes, cards, disks, stationery), maintenance cost accommodation cost, insurance/power/telephone; standby arrangements and comparatives costs of alternative methods of processing.

4.6 TRAINING:

Time must be allowed for training personnel who will be involved in the new system. All procedures must be explained to the people who will be using this system. The type of implementation must be made clear to management. In this case, implementation falls under parallel.

4.7 TESTING:

The system must undergo a system test once all programs have been written and a training of departmental staff has been completed. Time must be allowed. Testing is a system implementation. During this period, test data are used. Logical, physical designs are tested for workability. Testing is a confirmation that the system works.

4.8 STARTING THE PROGRAM:

To execute the program the user must run the Dbase program as follows:
C:/CD Dbase the process ENTER.
C:/Dbase/Dbase then press ENTER

After getting the DOS PROMPT in the Dbase IV environment, then the user can now execute the program by typing thus:

DO PROGRAM:

When the program starts executing the main menu is displayed.

The MENU consists of the following:

“ADD RECORD(S)”

“DELETE RECORD(S)”

“MODIFY RECORD(S)”

“PROCUREMENT REPORT”

“REPORT SUMMARY”

EXIT.

To ADD records – Is use to add new record(s) to the Dbase file. The user if prompted for the operation code, when these data are supplied the record is added to the Dbase.

CHAPTER FIVE

5.1 SUMMARY/RECOMMENDATION:

The system of obtaining storing and retrieval of data/information has Undergone tremendous changes with the emergence of information Technology. This dynamism can never be over emphasized. The trend Now is computers to take the place of manual ways of doing things. Federal Airports Authority of Nigeria should champion this new development if it is to achieve its laudable objectives. Computer technology, which is the greatest facilitator of IT, should develop fast in the Airports system. To known and modern Airport means that all operations are fully computerized.

There are many benefits derived from this changed viz.

- (i) Data management has become scientific, efficient and confidence Is being repose on data base management systems (DBMS).
- (ii) Information is not lost but are being kept with high protection.
- (iii) Access to the data is fast within the shortest time possible and Users friendly.
- (iv) A lot of benefits are available as the processed data facilities Better decision making by management.

In this vein therefore, the project wish to recommend the following:

- (1) That all manual operations at the Airport be changed to the new System.
- (2) The changes should proceed in a gradual manner to avoid sudden collapse of the system.
- (3) An intensive training of workers, not only to interact with computer but become literate enough to execute programs and program application.
- (4) Database management should be established and the need to work towards Internet, i.e. having a website.
- (5) The introduction and use of high level language be introduced particularly, the use of Database IV commands, be encourage to the data base administrators.
- (6) The process should closely be monitored so as to reach a complete change over to new system.
- (7) FAAN should connect all Airports with server or mainframe at Headquarters of FAAN.

REFERENCES

- Badmus,R. (2002) ; System Analysis and Design: A course Material, F.U.T. (unpublished)
- Blaas (1997) Quality Service on the ground; Airport Terminal International (pp 69)
- Frank et al (2001); Information technology connectivity counts: passenger terminal world pp 40 – 44 (U.K)
- Hakimi, D. (2002); Database Management system; Course material, F.U.T Minna (unpublished).
- Jeffrey Rogers E.O.S (1997); Reinventing the Airports; Airport Technology International: pp 27 (U.K)
- Kelleyanne Noone; (2001); A Smarter Airport; Passenger Terminal World: pp 46 – 50 (U.K)
- Ken Greer; (1997); Let's get automated; Airport Terminal International p31 (U.K)
- Michael, J. Mc Carey; (1999); Shared systems.
- Nancy Shapira (1999); Airport System Integration, What have we learned and how do we apply it? International Airports Review pp 49 – 51 (U.K)
- Nancy Shapira , (2000); Airport advertising: p88 (U.K)
- Ray Moses et al, (2001); Tower of Integration: Annual Technology Showcase Issue. pp173 & 174
- Sam Lott (1999); Terminal Integration – A system engineering perspective; Passenger terminal world (p.1145)

```
SET TALK OFF
SET SAFETY OFF
SET SCORE OFF
SET CONFIRM ON
SET ESCAPE ON
SET MESSAGE TO ""
SET DEVICE TO SCREEN
SET STATUS OFF
CLEA ALL
store space(12) to tmonth
SET COLOR TO GR+, G, G
CLEAR
DO MAINBUD
STOPPER = ' '
DO WHILE STOPPER = ' '
DO DEFIN
DO MAIN
CLEAR
ENDDO
RETURN
```

```
PROCEDURE DEFIN
IF ISCOLOR()
    SET COLOR OF BOX TO GR+/BG
    SET COLOR OF NORMAL TO W+/B
    SET COLOR OF HIGHLIGHT TO GR+/BG
    SET COLOR OF MESSAGES TO W+/N
    SET COLOR OF TITLES TO W/B
    SET COLOR OF FIELDS TO N/BG
    SET COLOR OF INFORMATION TO B/W
ENDIF
```

```
SET BORDER TO DOUBLE
```

```
* SET BORDER TO DOUBLE
DEFINE POPUP MAINMENU FROM 1,25
DEFINE BAR 1 OF MAINMENU PROMPT " M A I N   M E N U " SKIP
DEFINE BAR 2 OF MAINMENU PROMPT "======" SKIP
DEFINE BAR 3 OF MAINMENU PROMPT "ADD RECORD(s)";
    MESSAGE "Addition of record(s) to the database file"
DEFINE BAR 4 OF MAINMENU PROMPT "DELETE RECORD(s)";
    MESSAGE "This option allows deletion of record(s)"
DEFINE BAR 5 OF MAINMENU PROMPT "MODIFY RECORD(s)";
    MESSAGE "This option allows modification of record(s)"
DEFINE BAR 6 OF MAINMENU PROMPT "OPERATIONS      ";
    MESSAGE "This option allows you to record operations"
DEFINE BAR 7 OF MAINMENU PROMPT "REPORT SUMMARY";
    MESSAGE "This option allows Generation of reports"
DEFINE BAR 8 OF MAINMENU PROMPT "E X I T ";
    MESSAGE "You want to Shutdown"
```

ON SELECTION POPUP MAINMENU DO MAIN_PARA

```
*-----> Popup for Report
DEFINE POPUP REPOM FROM 6,45
DEFINE BAR 1 OF REPOM PROMPT " R E P O R T   M E N U" SKIP
DEFINE BAR 2 OF REPOM PROMPT "===== " SKIP
DEFINE BAR 3 OF REPOM PROMPT "LANDED SUMMARY";
    MESSAGE "Generate report of landings "
DEFINE BAR 4 OF REPOM PROMPT "TAKE-OFF SUMMARY ";
    MESSAGE "Generate report of take-offs"
DEFINE BAR 5 OF REPOM PROMPT "GENERAL SUMMARY ";
    MESSAGE "Generate report of landings & take-offs "
ON SELECTION POPUP REPOM DO REPO_PARA
```

```
*-----> Popup for Exit
DEFINE POPUP EXITM FROM 7,45
DEFINE BAR 1 OF EXITM PROMPT " E X I T   M E N U" SKIP
DEFINE BAR 2 OF EXITM PROMPT "===== " SKIP
DEFINE BAR 3 OF EXITM PROMPT "EXIT TO PROMPT";
    MESSAGE "Return to the Dbase Prompt"
DEFINE BAR 4 OF EXITM PROMPT "EXIT TO DOS ";
    MESSAGE "Shutdown and return to DOS"
ON SELECTION POPUP EXITM DO EXIT_PARA
```

PROCEDURE MAINBUD

```
* -----> This section design the screen
DEFINE WINDOW MAINSC FROM 1,1 TO 22,78 NONE COLOR W+/B
DEFINE WINDOW WORK_IN FROM 7,5 TO 21,75 DOUBLE COLOR W+/B
ACTIVATE WINDOW MAINSC
@1,20 to 3,60 double
ACTIVATE WINDOW WORK_IN
RETURN
```

```
PROCEDURE MAIN
ACTIVATE POPUP MAINMENU
RETURN
```

PROCEDURE MAIN_PARA

```
DO CASE
    CASE BAR() = 3
        DO ADDREC
    CASE BAR() = 4
        DO DELREC
    CASE BAR() = 5
        DO MODREC
    CASE BAR() = 6
        DO OPERATE
    CASE BAR() = 7
```

```
        ACTIVATE POPUP REPOM
        DEACTIVATE POPUP
CASE BAR() = 8
        ACTIVATE POPUP EXITM
        DEACTIVATE POPUP
ENDCASE
RETURN
```

```
PROCEDURE REPO__PARA
DO CASE
    CASE BAR() = 3
        DO REPLAND
    CASE BAR() = 4
        DO REPTAKE
    CASE BAR() = 5
        DO REPBOTH
ENDCASE
RETURN
```

```
PROCEDURE EXIT__PARA
DO CASE
    CASE BAR() = 3
        STOPPER = 'Q'
        CANCEL
    CASE BAR() = 4
        QUIT__
ENDCASE
RETURN
```

```
Procedure ADDRREC
    store 'Y' to ans
    set stat off
    use craft
    do while ans = 'Y'
        clear
        store space(7) to mcraftno
        @1,10 Say "Enter Aircraft Number: " get mcraftno Pict "!!-
XXXX"
        read
        locate all for craftno = mcraftno
        if found()
            @8,20 say 'Record already exist'
        else
            store space (20) to mcompany
            store space(6) to maircode
            DO GETDATA
            READ
            clear
            append blank
```

```

        replace craftno with mcraftno
        replace company with mcompany
        replace aircode with maicode
    endif
    @10,10 to 12,50
    store 'N' to ans
    @11,12 say 'Are there more records? (Y/N)' get ans pict '!';
        valid ans $ 'YN' error 'Invalid entry !!!'
    read
enddo
CLEAR
close databases
return

```

Procedure DELREC

```

    store 'Y' to ans
    use craft
    do while ans= 'Y'
        clea
        @2,15 to 4,55
        @3,20 say 'Deletion of record'
        store space(7) to mcraftno
        @1,10 Say "Enter Aircraft Number: " get mcraftno Pict "!!-
        XXXX"
        read
        locate all for craftno = mcraftno
        if found()
            @10,10 to 12,50
            store 'N' to reply
            @11,12 say 'Are sure? (Y/N)' get reply pict '!';
                valid reply $ 'YN' error 'Invalid entry!!!'
            read
            if reply = 'Y'
                dele
                pack
            endif
        else
            @8,20 say 'Record does not exist'
        endif
        @10,10 clea to 12,50
        @10,10 to 12,50
        store 'N' to ans
        @11,12 say 'Delete more records? (Y/N)' get ans pict '!';
            read
    enddo
CLEAR
close data
return

```

Procedure MODREC

```
use craft
store 'Y' to ans
do while ans = 'Y'
  clea
  store space(7) to mcraftno
  @1,10 Say "Enter Aircraft Number: " get mcraftno Pict "!!-
  XXXX"
  read
  locate all for craftno = mcraftno
  if found()
    store company to mcompany
    store aircode to maircode
    DO GETDATA
    READ
    clear
    replace craftno with mcraftno
    replace company with mcompany
    replace aircode with maircode
  else
    @8,20 say 'Record does not exist'
  endif
  @10,10 to 12,50
  store 'N' to ans
  @11,12 say 'Modify more record? (Y/N)' get ans pict '!!';
  valid ans $ 'Y/N' error 'Invalid entry!!!'
  read
enddo
CLEAR
close databases
return
```

Procedure OPERATE

```
sele a
  use craft
sele b
  use trans
  store 'Y' to ans
  store space(8) to moptype
  store 0 to mopnum
  store space(12) to mmonth
  do while ans = 'Y'
    clea
    store space(7) to mcraftno
    @1,10 Say "Enter Aircraft Number: " get mcraftno Pict "!!-
    XXXX"
    read
  sele a
    locate all for craftno = mcraftno
```

```

if found()
  store company to mcompany
  store aircode to maicode
  DO GETDATA2
  sele b
  appe blank
  repl craftno with mcraftno
  repl optype with moptype
  repl opnum with mopnum
  repl month with mmonth

else
  @8,20 say 'Record does not exist'
endif
@10,10 to 12,50
store 'N' to ans
@11,12 say 'Are there more Operations? (Y/N)' get ans pict
'!';
      valid ans $ 'Y/N' error 'Invalid entry!!!!'
  read
enddo
CLEAR
close databases
return

```

```

Procedure REPLAND
define window user from 1,1 to 22,78 none color W+,B
activate window user
set stat off
set alternate to 'land.out'
set device to screen
  set alternate on
  set space on
  sele a
  use craft
  sele b
  use trans
  do getdata3
  sele a
  do while .not. eof()
    store craftno to mcraftno
    sele b
    sum all opnum for mcraftno=craftno .and. optype =
"Landed" ;
    .and. month = tmonth to mland
    sele a
    repl landed with mland
    skip
  enddo
  sele a

```



```

        go top
        ct = 1
        mtot = 0
        DO HEADING with 1
do while .not. eof()
if landed <> 0
    ? space(10), '|', str(ct, 3), '|', craftno, '|', company, '|',
    ',aircode, '|', str(landed, 3), '| '
    ct = ct + 1
    mtot = mtot + landed
    ? space(10), replicate('-', 64)
endif
    skip
enddo
? space(54), 'TOTAL = ', str(mtot, 9, 2)
?
set alternate off
wait
close data
deactivate window user
return

```

```

Procedure REPTAKE
define window user from 1,1 to 22,78 none color W+,B
activate window user
set stat off
set alternate to 'take.out'
set device to screen
    set alternate on
    set space on
    sele a
    use craft
    sele b
    use trans
    do getdata3
    sele a
    do while .not. eof()
        store craftno to mcraftno
        sele b
        sum all opnum for mcraftno=craftno .and. optype =
"Take-off" ;
        .and. month = tmonth to mland
        sele a
        repl takeoff with mland
        skip
    enddo
    sele a
    go top
    ct = 1
    mtot = 0

```

```

DO HEADING with 2
do while .not. eof()
if takeoff <> 0
? space(10), '|', str(ct, 3), '|', craftno, '|', company, '|',
',aircode, '|', str(takeoff, 3), '|',
ct = ct + 1
mtot = mtot + takeoff
? space(10), replicate('-', 66)
endif
skip
enddo
? space(54), 'TOTAL = ', str(mtot, 9, 2)
?
set alternate off
wait
close data
deactivate window user
return

```

Procedure REPBOTH

```

define window user from 1,1 to 22,78 none color W+,B
activate window user
set stat off
set alternate to 'both.out'
set device to screen
    set alternate on
    set space on
    sele a
    use craft
    sele b
    use trans
    do getdata3
    sele a
    do while .not. eof()
        store craftno to mcraftno
        sele b
        sum all opnum for mcraftno=craftno .and. optype =
"Landed" ;
        .and. month = tmonth to mland1
        sum all opnum for mcraftno=craftno .and. optype =
"Take-off" ;
        .and. month = tmonth to mland
        sele a
        repl landed with mland1
        repl takeoff with mland
        skip
    enddo
    sele a

```

```

go top
ct = 1
mtot = 0
mtot1 = 0
DO HEADING with 3
do while .not. eof()
? '|',str(ct,3),' | ',craftno,' | ',company,' | ',aircode,' | '
?? str(landed,3),' | ',str(takeoff,3),'
|',str(landed|takeoff,4),' | '
ct = ct + 1
mtot = mtot + takeoff
mtot1 = mtot1 + landed
? replicate('-',83)
skip
enddo
? space(45),'TOTAL = ',str(mtot1,4),' ',str(mtot,4),'
',str(mtot1+mtot,4)
?
set alternate off
wait
close data
deactivate window user
return

```

PROCEDURE GETDATA

CLEAR

@ 3,5 SAY "Aircraft Number :" + Mcraftno

@ 6,5 SAY "Company Name :" GET Mcompany PICT "@!"

@ 9,5 SAY "Aircraft Code :" GET Maircode PICT "@!"

RETURN

PROCEDURE GETDATA2

CLEAR

@ 3,5 SAY "Aircraft Number :" + Mcraftno

@ 6,5 SAY "Action Type :" GET Moptype PICT "@M Landed,Take-off";

Message "Press Space bar to see options"

@ 9,5 SAY "Number :" GET Mopnum PICT "@!"

@ 12,5 SAY "Month :" GET Mmonth PICT "@M

January, February, March, ;

April, May, June, July, August, September, October, November, December";

Message "Press Space bar to see options"

read

RETURN

PROCEDURE GETDATA3

CLEAR

@ 5,5 SAY "Month : " GET tmonth PICT "@M
January, February, March, ;

April, May, June, July, August, September, October, November, December";
Message "Press Space bar to see options"

read
RETURN

PROCEDURE HEADING

PARAMETER LI.

? space(19), "FEDERAL AIRPORT AUTHORITY OF NIGERIA, MINNA"
? space(19), "*****"

?
?

IF LL = 1

? space(12), " AIRCRAFT LANDING STATISTICS FOR THE MONTH OF " +
TMONTH

?
space(12), "*****"
***"

?

? space(10), REPLICATE(" ", 64)

? space(10), "* Aircraft * *
Aircraft * *"

? space(10), "* S/NO * Number * COMPANY NAME * Code
* LANDED *"

? space(10), REPLICATE(" ", 64)

ELSE

IF LL = 2

? space(12), " AIRCRAFT TAKE-OFF STATISTICS FOR THE MONTH OF " +
TMONTH

?
space(12), "*****"
***"

?

? space(10), REPLICATE(" ", 66)

? space(10), "* Aircraft * *
Aircraft * *"

? space(10), "* S/NO * Number * COMPANY NAME * Code
* TAKE-OFF *"

? space(10), REPLICATE(" ", 66)

ELSE

? space(6), " AIRCRAFT LANDING & TAKE-OFF STATISTICS FOR THE
MONTH OF " + TMONTH

?

space(6), "*****"
*****"

?

? REPLICATE(" ", 83)

:

```
? "*"      * Aircraft *
*          *          *
? "*" S/NO *   Number *   COMPANY NAME   * Aircraft *
LANDED * TAKE-OFF * TOTAL *              * Code *
? REPLICATE ("*", 83)
ENDIF
ENDIF
RETURN
```

FEDERAL AIRPORT AUTHORITY OF NIGERIA, MINNA

AIRCRAFT LANDING STATISTICS FOR THE MONTH OF January

* S/NO *	* Aircraft * Number	* COMPANY NAME	* Aircraft * Code	* LANDED *	*

1	5N-5665	EXP AIRWAYS	B727	11	
2	5N-4543	OKADA AIRWAYS	C300	2	
3	5N-Y333	BELLVIEW AIRWAYS	C340	4	
4	DR-34R4	KABO AIRLINES	C500	6	
5	5N-WEZ	KINGS AIR	E110	1	
6	5N-QAS	GHANA AIRWAYS	B747	3	
7	DR-456	NIGERIAN AIRWAYS	B787	5	
8	DR-563	ETHIOPIA AIRWAYS	B747	8	
9	5N-LKJ	BAROFLOT AIRWAYS	F101	2	
10	5N-R12	EAS AIRWAYS	B707	10	
11	5N-344	SKYLINE AIRWAYS	F600	6	
				TOTAL =	58.00

FEDERAL AIRPORT AUTHORITY OF NIGERIA, MINNA

AIRCRAFT TAKE-OFF STATISTICS FOR THE MONTH OF January

*****				*****			
* S/NO *	* Aircraft Number *	* COMPANY NAME *	* Aircraft Code *	* TAKE-OFF *			*
1	5N-5665	EXP AIRWAYS	B727	11			

2	5N-4543	OKADA AIRWAYS	C300	2			

3	5N-Y333	BELLVIEW AIRWAYS	C340	4			

4	DR-34R4	KABC AIRLINES	C500	6			

5	5N-WEZ	KINGS AIR	E110	1			

6	5N-QAS	GHANA AIRWAYS	B747	3			

7	DR-456	NIGERIAN AIRWAYS	B787	5			

8	DR-563	ETHIOPIA AIRWAYS	B747	3			

9	5N-LKJ	BAROFLOT AIRWAYS	F101	2			

10	5N-R12	EAS AIRWAYS	B707	10			

11	5N-344	SKYLINE AIRWAYS	F600	6			

				TOTAL =			58.00

FEDERAL AIRPORT AUTHORITY OF NIGERIA, MINNA

AIRCRAFT LANDING STATISTICS FOR THE MONTH OF February

```

*****
*      * Aircraft *                               * Aircraft *
* S/NO * / Number *      COMPANY NAME          * Code * LANDED *
*****
|  1  |  5N-5665  |  EXP AIRWAYS          |  B727  |  10  |
-----
|  2  |  5N-4543  |  OKADA AIRWAYS       |  C300  |   3  |
-----
|  3  |  5N-Y333  |  BELLVIEW AIRWAYS    |  C340  |   4  |
-----
|  4  |  DR-34R4  |  KABO AIRLINES       |  C500  |   6  |
-----
|  5  |  5N-WEZ   |  KINGS AIR           |  E110  |   2  |
-----
|  6  |  5N-QAS   |  GHANA AIRWAYS       |  B747  |   4  |
-----
|  7  |  DR-456   |  NIGERIAN AIRWAYS    |  B787  |   4  |
-----
|  8  |  DR-563   |  ETHIOPIA AIRWAYS    |  B747  |   8  |
-----
|  9  |  5N-LKJ   |  BAROFLOT AIRWAYS    |  F101  |   8  |
-----
| 10  |  5N-R12   |  EAS AIRWAYS         |  B707  |   1  |
-----
| 11  |  5N-344   |  SKYLINE AIRWAYS     |  F600  |   5  |
-----
TOTAL = 55.00

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FEDERAL AIRPORT AUTHORITY OF NIGERIA, MINNA

AIRCRAFT TAKE-OFF STATISTICS FOR THE MONTH OF February

```
*****
*      * Aircraft *      * Aircraft *
* S/NO * Number * COMPANY NAME * Code * TAKE-OFF *
*****
| 1 | 5N-5665 | EXP AIRWAYS | B727 | 10 |
-----
| 2 | 5N-4543 | OKADA AIRWAYS | C300 | 3 |
-----
| 3 | 5N-Y333 | BELLVIEW AIRWAYS | C340 | 4 |
-----
| 4 | DR-34R4 | KABO AIRLINES | C500 | 6 |
-----
| 5 | 5N-WEZ | KINGS AIR | E110 | 2 |
-----
| 6 | 5N-QAS | GHANA AIRWAYS | B747 | 4 |
-----
| 7 | DR-456 | NIGERIAN AIRWAYS | B787 | 4 |
-----
| 8 | DR-563 | ETHIOPIA AIRWAYS | B747 | 8 |
-----
| 9 | 5N-LKJ | BAROFLOT AIRWAYS | F101 | 8 |
-----
| 10 | 5N-R12 | EAS AIRWAYS | B707 | 1 |
-----
| 11 | 5N-344 | SKYLINE AIRWAYS | F600 | 5 |
-----
```

TOTAL = 55.00

FEDERAL AIRPORT AUTHORITY OF NIGERIA, MINNA

AIRCRAFT LANDING & TAKE-OFF STATISTICS FOR THE MONTH OF January

* Aircraft *			* Aircraft *				
* S/NO *	Number	COMPANY NAME	* Code	* LANDED *	* TAKE-OFF *	* TOTAL *	
1	5N-5665	EXP AIRWAYS	B727	11	11	22	
2	5N-4543	OKADA AIRWAYS	C300	2	2	4	
3	5N-Y333	BELLVIEW AIRWAYS	C340	4	4	8	
4	DR-34R4	KABO AIRLINES	C500	6	6	12	
5	5N-WEZ	KINGS AIR	E110	1	1	2	
6	5N-QAS	GHANA AIRWAYS	B747	3	3	6	
7	DR-456	NIGERIAN AIRWAYS	B787	5	5	10	
8	DR-563	ETHIOPIA AIRWAYS	B747	8	8	16	
9	5N-LKJ	BAROFLOT AIRWAYS	F101	2	2	4	
10	5N-R12	EAS AIRWAYS	B707	10	10	20	
11	5N-344	SKYLINE AIRWAYS	F600	6	6	12	
				TOTAL =	58	58	116

FEDERAL AIRPORT AUTHORITY OF NIGERIA, MINNA

AIRCRAFT LANDING & TAKE-OFF STATISTICS FOR THE MONTH OF February

S/NO	Aircraft Number	COMPANY NAME	Aircraft Code	LANDED	TAKE-OFF	TOTAL
1	5N-5665	EXP AIRWAYS	B727	10	10	20
2	5N-4543	OKADA AIRWAYS	C300	3	3	6
3	5N-V333	BELVIEW AIRWAYS	C340	4	4	8
4	DR-34R4	KABO AIRLINES	C500	6	6	12
5	5N-WEZ	KINGS AIR	E110	2	2	4
6	5N-QAS	GHANA AIRWAYS	B747	4	4	8
7	DR-456	NIGERIAN AIRWAYS	B787	4	4	8
8	DR-563	ETHIOPIA AIRWAYS	B747	8	8	16
9	5N-LKJ	BAROFLOT AIRWAYS	F101	8	8	16
10	5N-R12	EAS AIRWAYS	B707	1	1	2
11	5N-344	SKYLINE AIRWAYS	F600	5	5	10
TOTAL =				55	55	110