

TITLE PAGE

**GEOGRAPHIC INFORMATION SYSTEM (GIS) FOR
EFFECTIVE LAND ADMINISTRATION**

GEOGRAPHIC INFORMATION SYSTEM (GIS) FOR

FOR (A case study of double allocation of land in Maitama District A6)

By

BILSHAKKA STEVE FITKA
PGD/MCS/98/99/734

A Project submitted to the department of Mathematics and Computer Science in partial fulfilment of the requirement for the award of Post-Graduate Diploma in Computer Science of Federal University of Technology, Minna - Niger State.

September, 2000

(i)

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CERTIFICATION

This is to certify that this project is an original work undertaken by **BILSHAKKA STEVE FITKA**, *PGD/MCS/98/99/734* and has been prepared in accordance with the regulations governing the preparation and presentation of Postgraduate project of the Federal University of Technology Minna, Niger State.

.....
DR. AIYESIMI YOMI
Project Supervisor

.....
Date

.....
DR. A.S. REJU
Head of Department

.....
Date

.....
External Examiner

.....
Date

DEDICATION

This book is dedicated to the Almighty God for his mercies over us and to my late beloved father.

ABSTRACT

The nature need and objectives of a computerised Geographic Information System as well as overview of GIS principles and major components are examined.

Issues concerning awareness and human and organisational problems. Software/Hardware configuration, cost and data capture availability and linkage are discussed in details. Database management system is highlighted. Other issues handled in the project include research and development, Co-ordination, Conceptual GIS is recommended with special references with problems in developing countries.

CHAPTER ONE

INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEM

1.1 INTRODUCTION.

The project covers activities in the department of land, planning and Surveys, for the production/retrieval of information about land allocated to individuals, private and government organisations within the Federal Capital Territory (FCT), thus many characteristics of various sizes and purposes of land allocation are taken into consideration in the design. Entry of input in the system is through the Keyboard and visual display Unit.

The GIS for land allocation is design to combine the advantages of the manuals and system as flexible and easy access to information and straight forward operation with improved accuracy, avoidance of duplication and better management information.

1.2 DEFINITION OF GEOGRAPHIC INFORMATION SYSTEM (GIS)

GIS is a computer system, which perform operation on spatial data, that is, data, which have positional references. GIS interest is the spatial data; it is therefore necessary to understand spatial data as geo reference data that have shape, size, dimension and physical form.

They represent features of our real world, maps and drawings, are historical spatial database. Spatial information has two major components namely:

- (1) Graphical;
- (2) Non Graphical

Graphical (or geometrical) information refers to the shape, size and length of features and how the features are spatially related to one another (Topology). Non graphical information on the other hand, refers to the attributes of a feature such as the name of a highway or the owner of a land parcel. Regardless of how the information is actually stored on the computer.

It is sometimes convenient to regard the database as being composed of the graphical database and the attributes, each of which is related to the other. A computer database containing predominantly spatial information is called a geographic information system. For this database to be of any use, a computer system must be built around it to allow for easy input analysis and display of information.

Spatial information is therefore the term that encompasses data and knowledge about the location and distribution of earth related entities.

These entities can be natural object such as trees, natural phenomenon such as precipitation or man made.

Object such as land parcel or man made phenomenon such as population densities. A spatial information system is used to create, maintain and to disseminate such information, it includes the organisational context, or structure that manage the system and procedures and tools, such as geographic information system GIS registered for systems operation.

1.3 ESTABLISHMENT OF FCDA

Federal capital Development Authority with acronym (FCDA) was Established by decree No. 6 of 4th February'76 and has seven departments namely;

- a. Department of Finance;
- b. Department of Administration and Personnel;
- c. Department of Health;
- d. Department of Land, Planing and Survey;
- e. Department of Agriculture;
- f. Department of Public works;
- g. Legal Department.

The department of interest in this project is the department of Land, Planing and Survey.

1.4 RESPONSIBILITIES AND STRUCTURE OF DEPARTMENT OF LPS.

Department of Land, Planing and survey is divided into three main Divisions namely;

- Land Division;
- Planing Division;
- Survey Division.

And the responsibilities of the department are as follows.

- a. Prepare a layout of land within the FCT;
- b. Carry out survey or demarcation of parcel of land;
- c. Allocate land to individuals, private and governmental organisation;
- d. Monitor the development of infrastructure within the FCT;
- e. Check illegal structure of development within the FCT;
- f. Advise the Resettlement Committee on the best methods for resettlement and payment of compensation to the displaced persons of the FCT;
- g. Approved building plans for the development within the FCT;

- h. Check illegal allocations and sales of Land by the village wards or heads within the FCT;
- i. Prepare and issue Certificate of Occupancy to the allottees of lands within the FCT;
- j. Check the mixed up in the allocation of land and advise the authority on the best methods of reallocation of the plots to the allottees.

1.5 AIMS AND OBJECTIVES OF THIS PROJECT.

The project treats the retrieval of information on the activities and allocation of plots within FCT and the objective of this project are:

- a. Development of Computerised methods of checking allocation of plots within FCT in order to reduce and stop the cases of mixed up or double allocation of plots within the FCT.
- b. To provide an opportunity for the department on how best information on plots or land allocation can be carried out.
- c. To provide means of generating summaries of the allocation of plots or land within FCT.
- d. To provide appropriate security to the nature of information collected and held.
- e. For the system to allow interactive and batch mode of processing for the preparation of the best methods of allocation of land or plots within FCT which could be monthly, quarterly or yearly reports of the allocation.

1.6 STATEMENT OF PROBLEMS

These are the factors that leads to the mixed up or double allocation of plots or land within the Federal Capital Territory:

- a. Lack of proper recommendation record by planing division;
- b. Changes in the recommendation earlier made from planing unit by the authority or management;
- c. Lack of proper communication between the authority or the management and the allottees of the plots or land;
- d. Subdivision of plots and renumbering (NEW NOS);
- e. Lack of proper allocation procedures;
- f. Lack of proper records from Carto Unit.

1.7 COMPONENTS OF GIS.

GIS have three very important Components namely:-

- a. Computer hardware;
- b. Sets of application software modules;
- c. A Proper Organisational context.

These three components need to be in balance if the system is to function satisfactorily.

(1) Computer hardware

The general hardware components of a GIS are as presented in the fig.1 below. The Computer is link to a disk drive storage unit that provides space for storing data and program.

A digitiser used to convert data from maps to the computer.

A Plotter is used to present the result of the data processing and a tape drive is used for storing data or program on magnetic tape.

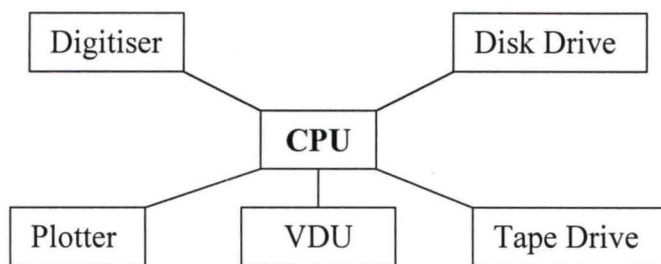


Fig. 1

The user controls the peripherals (a general term for plotters, printers, digitisers and other apparatus link to the computer) via a visual display unit. (VDU) otherwise known as a terminal. The user terminal might itself be a microcomputer special hardware to allows maps to be displayed on the screen quickly GIS software modules.

There are five basis terminal modules constitute the software packages for a GIS.

These modules are sub-system for:-

- a. Data input and database verification;

- b. Data storage and database management;
- c. Data out put and presentation;
- d. Data transformation;
- e. Interactive with the users.

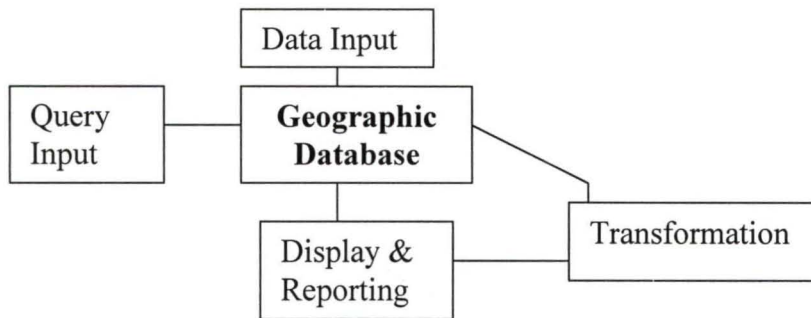


Fig. 2

Data input covers all aspects of transformation of data captured from existing maps, field observation and sensors into compatible digital form. A variety of computer tools are available for this purpose which include VDU, the digitisers, and so on.

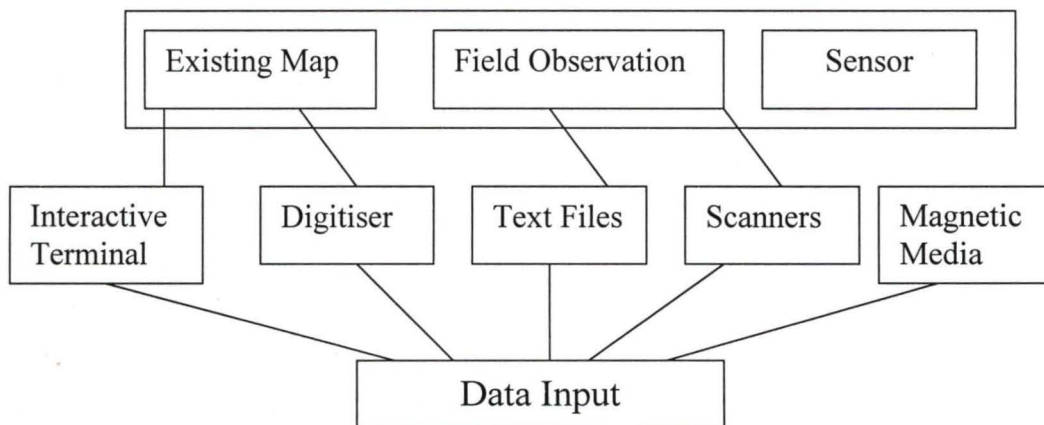


Fig. 3

Data storage and database management concern the way in which data about the position linkage (topology) and the attributes, of geographical elements (points, lines and areas representing objects on the earth surface) structured and organised.

***The organisational aspect of GIS**

The five technical subsystem earlier mentioned govern the way in which geographic information can be processed but they do not however on themselves guarantee effective usage.

In order to be used effectively, the GIS needs to be placed in the appropriate organisational context. It is simply insufficient for any organisation to purchase a computer and some software.

To do this properly requires necessary investment in hardware and software and retraining of personnel and managers to use the new technology in proper organisational context.

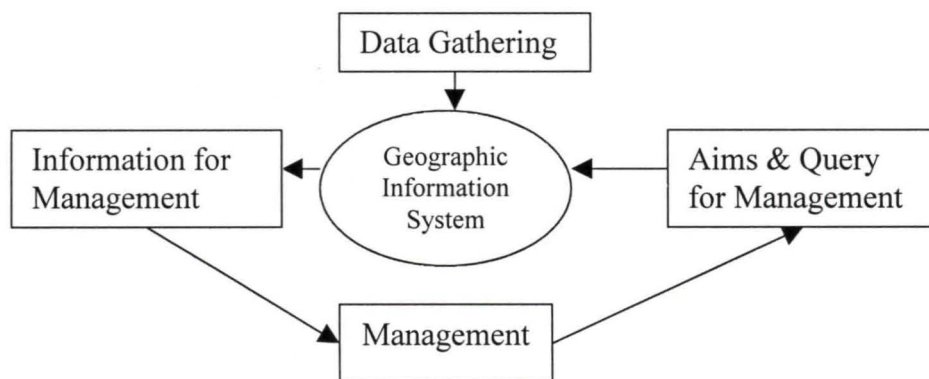


Fig. 4

1.8 LIMITATION AND SCOPE OF THE PROJECT

The limitation of the project is that it should covers and check whether the plots with certain number “A” has been allocated initially using the key field name that will be introduced later in the project. And the scope of the project is that the project will be design in such a way that all the plots numbered within a layout of any district should be registered in the computer and when allocated, there will be source code or key field name to detect the status of the existing plot within the district.

1.9 RELEVANCE OF THE PROJECT

The relevance of the project cannot be over emphasised because with the introduction of source code or key field name, a plot within a district cannot be allocated to two applicants because as it is inputted into the computer the key field name or source code shall be able to detect that plot number “A” has been allocated already, thereby the issue of double allocation, i.e. one plot allocating to two applicants will be eliminated.

CHAPTER TWO

LITERATURE REVIEW

2.1 DEVELOPMENT OF GEOGRAPHIC INFORMATION SYSTEM (GIS).

Geographical information system are becoming more and more popular and widespread among commercial and administrative organisation and, reflecting this trend. GIS have excellent facilities for data management and data display, but they do not have all the facilities for data analysis that many users would like to see. Geographic information system which is a computer based system for collecting, storing managing, retrieving, transferring, displaying, querying and mapping spatial data from the world for a particular set of purposes. Digital mapping overlaps by more than ninety percent, with GIS. In addition to being able to provide a digital map and GIS has the capability to provide spatial analysis to the end users.

2.2 DATABASE MANAGEMENT SYSTEM (DBMS)

Database management system (DBMS) were designed to facilitate storage and retrieval of large data collection they include facilities to secure and project data, enforce consistency of the data stored and make data available to multiple users at the same time.

All data for geographic information system (GIS) have to be converted to numeric value by the database software package before they can become useful for GIS processing and operation. At this point I feel that it is unnecessary to discuss the role which database systems play in information industry in general, give the basics concepts of data base systems, their characteristics and an overview of the component special attention shall be paid to the database in GIS and mapping applications.

In the computer environment the term database is used specifically to indicate data stored in a computer storage media. A data processing systems that uses database is termed a database system.

I shall discuss databases in the context of database systems because databases without data processing systems have no sense in the computer environment. The five components of a database system are as follows.

- a. A Collection of data stored on computer compatible media;
- b. Hardware to enable input, processing and presentation of data;
- c. Software for handling the task stated above;
- d. Personnel to operate and manage the system;
- e. Documentation.

The creation of a database is a complex and time-consuming task, which may be accomplished in two ways:-

1. Design and implementation of database system;
2. Collection and input of data.

While the second phase is as a rule entirely the responsibility of a user the first phase is more or less heavily supported by computer manufacturers, software designers and database theory.

In the order to design a database system, we have to create an image of the real world in the computer memory and provide the means to retrieve it. A user is usually not interest in such a total view, but only in a partial “user view” i.e. only in those aspect which are most relevant for information the user needs. It represent an efforts to make sense and understand a specific aspects of environment, such matters of interest may be for example: Land registration, Land use Utilities, Soil or multipurpose cadastral and further geology, vegetation, urban and rural development. To bring order into “Geo environment” individuals object send phenomena must be recognised. Such objects and phenomena form the building blocks for the database.

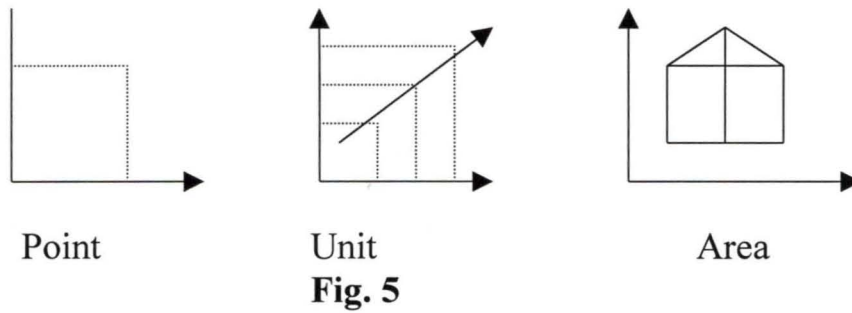
To represent a features in a computer in comprehensive way two types of data are required, (1) positional or graphic data and (2) attributes or semantic data. The positional representation should describe the position of a features and eventually its shape and size, while attributes data should give all other characteristics or properties of the features.

For example in case of a cadastral parcel, the position, shape and size may be represented by the co-ordinates of the corner points, while the attributes may includes owner, user, land use type etc. Which is the main focus of this project.

For a database system to be of economic sense usually many users share a database. The initial major step in design of the database system involves the analysis of the user views and their transformations into a common system comprising all individual view (conceptual view) in a database, a data item is the smallest data unit, which can take part in processing independently and meaningfully. e.g. an X-co-ordinate. A record is a storage unit, which may be directly accessed by a program and represent collection of items.

The graphic database contains mainly positional data. There are three basics types of graphic elements. Point, Line and Area.

A surface is 3-d graphic element.



All graphic element may be represented in 2 or 3 dimensional space.

Two system for representation of positional data have been developed.

Point (vector) and cell (Raster). In the point system a point is of the basic elements of representation. The position of a point may be uniquely defined by a pair co-ordinates (2-d system) or a triplet of co-ordinates (3-d. system) and stored accordingly.

In a cell (grid) system an atomic element is a cell which is an arial unit, usually a square. The whole region is covered by cells and cells are stored in a predefined order, the storage location of each cell determined uniquely its position. An isolated cell represents points. A line elements is defined as a sequence of cells each with no more than two neighbours and an areal elements is simply defined by agglomeration of cells of the equal attributes.

TYPES OF DATABASE INCLUDES:-

1. Network database - It represent a method of arranging data in a database so that explicit connection and relations are defined by links or pointer of many to many types.
2. Hierarchical database - It represent data as three structures, composed of hierarchy of data records. Computer files are arranged so that unit of data storage is connected in a hierarchically defined pathway.
3. Relational database - It represent data as a simple collection of 2 - dimensional tables, a relational structure is a method of structuring data relations between different entities and transformation.

2.3 MICROSOFT ACCESS COMPUTER PACKAGES.

Microsoft access computer package is one of the database management packages that are used for storing retrieving data from the database.

There are different ways, one can get started with Microsoft e.g. In some situation, the users of a shared database may not all be able to upgrade to Microsoft Access'97. You can share the database with users of different version of Microsoft Access'97, without having to alter your original database. One can upgrade part of your database to Microsoft access such as Microsoft access 97 so that it can take advantage of many new features and the original unchanged database for users of previous version. Users of all version can share the same

data. You can use this strategy whether your database is in one file or it is in a front end/back end application.

2.4 THE PRINCIPLE BEHIND GIS - OVERVIEW.

There have been paralleled developments as using computers for mapping and spatial data analysis in automated data capture, analysis and presentation in several broadly inter-related fields. These fields surveying and mapping, thematic cartography, Civil Engineering, geography urban and rural planing, remote sensing and image analysis, military applications etc. Consequently there has been much duplication of efforts and a multiplication of discipline specific jargon for different application in different places. This multiplicity lacking many kinds of spatial data processing together into truly general purposes geographical information system.

Essentially all these discipline are attempting the same sort of operation namely to develop a powerful set of tools for collecting sorting, retrieving at will, transforming and displaying spatial data from the world for particular set of purposes. It is this set of tools that constitute what is known as geographic information system.

Geographical data describe object from the real world in term's of:-

- a. Their position with respect to known co-ordinate system;

- b. Their attributes that are unrelated to positions (such as cost, colour, texture, Ph etc) and
- c. Their spatial inter-related with each other (topology).

Geographic information system do have a lot in common with computer aided design (CAD). System used for drafting a variety of technical objects. Both GIS and CAD systems need to be able to relate object to a frame of reference, both need to be able to handle non-graphical attributes and both need to be able to describe topographical relation. The major difference between GIS and CAD are the greater volume and diversity of the data input into GIS system and the specialised nature of the analysis methods used. There differences can be so large that an efficient unsuitable for GIS and vice-verse. GIS should be thought for as being very much more than means of coding, storing and retrieving data about certain aspects of the earth surface. In a very real sense the data in a GIS whether coded on a piece of paper or as invisible marks on the surface of a magnetic tape, should be thought of a representing a model of the real world.

This is because these data can be accessed transferred and manipulated interactively in a GIS, they can serve as a test bed on

studying environmental processes or for analysing the result of friends, or of anticipating the possible results for planning decisions. By using GIS it is in principle possible for planners and decision-makers to explore a range of possible scenarios and to obtain an idea of the consequences of a course of action before the mistakes or blunders have been irrevocably made in the landscape itself.

2.5. IMPLEMENTATION OF GIS

In order to develop geographic information system that are capable of disseminating comprehensive property information, a change in formation philosophy and practise is required, therefore since GIS software originally operated in standard mode.

GIS increasingly form part of a complex data processing environment. This makes the process of choosing and bench making a GIS is challenging task, which requires structured approach. GIS are rarely soft contained and is also necessary to consider the form of data transfer and the network environment.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN.

3.0 Before a computer can be used within a business or an organisation, to carryout task previously under taken by other means. It is important to examine the established procedures by which the business operate to see how they need to be changed to enable the efficient used of the computer. And this study is called system analysis which usually result in the design and implementation of a completely or partially new system.

It involves, analysis of all the different activities of the organisation developing detail procedures for collecting, manipulating and evaluating of all the related data. And the reason for the analysis to understand better activities of the establishment and the stages includes the following:-

- a. Feasibility study;
- b. Investigation and facts reading;
- c. Design and implementation;
- d. Data analysis and review.

3.1. THE EXISTING SYSTEM.

The present system that is existing is the manual methods of land allocation within the FCT by the department of land, planing and survey where the particulars of the applicants are compiled and also short listed by the recommending officers. And the first to analyse here is the organisation's main objectives of the system, based on the phases mentioned above which includes:-

The main reasons for the feasibility study is to be able to look at the project that is sufficient to department to be able to provide first and update information which will satisfied the reason for the new system.

At the course of this study data was collected about the difficulties faced with the existing system which includes slow access to files- it is not always easy to access information contain in the file because of too much volumes of files which are filed manually.

b. Less security and privacy of files As files are manually kept which sometimes not properly kept, there could be less security and privacy of files which could lead to lost of data or information.

b. Misplacement of files - This misplaced of files is carried after accessing it for an information which normally result in days of

delay in accessing the files at another time. Thereby as a result delay the management decision since they are based on files.

3.2 ANALYSIS OF THE EXISTING SYSTEM.

From the existing system it was observed that the land allocations within FCT by the department of land, planing and survey record keeping and retrieving has not being easy, with the problems and difficulties mentioned above, thus I concluded that there is the need for new methods of land allocation procedures, with the studying how the existing system work. Facts studied are as follows characteristics of land allocation unit affected by the system analysed reports and strength operation. For record updating, record keeping and record generation will be included in the new system.

Thereby reducing the management cost and reduce duplication of records and save time which will be easy to retrieve information about a particular plot or piece of land.

3.2.1 INVESTIGATION AND FACT RECORDING:-

The main purpose of this study is to fully understand the existing system and to identify the basic information requirement. And before the investigation commences it is very

important for the analysis to be absolutely clear about the objectives of the suggested computer application as defined by management. The main part of the investigation consist of facts finding exercise aimed at finding out how the work is currently performed, by whom and in what circumstances which includes the details examination of the existing manual system.

- Gathering of all relevant information by questionnaire, personal contact with staff members of the department of land planing and survey.
- Going through the existing records.

3.3 THE NEW SYSTEM.

The new system for the land allocation within FCT the department of Land, Planing and Survey shall be computer system based which will make the allocation faster, without duplication of record and to reduce management cost, which can be retrieved easily.

3.4 DATA COLLECTION AND INFORMATION GATHERING.

Data collection and the information gathered were done through the interview, asking officers in charge of land allocation within the department and also going through the existing records.

Basically, land allocation's applicants files is made up of the following entries:-

1. File Name i.e. applicant Name;
2. File No.
3. State of Origin;
4. Cad Zone;
5. Map sheet;
6. Plot no.
7. District;
8. Developmental phase;
9. Date of recommendation;
10. Date of allocation.

And the office analysis of the land allocations of Maitama district will be included in its files as mentioned above.

The report layout obtains from the department of land planning and survey shown below.

“NAME OF ORGANISATION”

LAND PLANING AND SURVEY DEPARTMENT.

1. File Name;
2. File Number;

keeping within the department. The existing system is an important sources of information for the development of the proposed system. The old manual system has been in operation since the inception of the department.

3.5 SOFTWARE AND HARDWARE REQUIRED FOR GIS.

Software - is a set of instrument used by the Computer to solve a particular problem. Therefore the word GIS has a broad meaning to the makers of software and the choice of software for a particular use depends on the nature and data to be processed.

These are source useful GIS software available in the market today.

- (a) ARC/info
- (b) Integrated Land and water information system (ILWIS)
- (c) SyneGIS
- (d) APIC

And another modules which constitute.

Some basic software packages for a GIS are as follows

- (a) Data input and verification;
- (b) Data storage and database management;
- (c) Data output and presentation;

- (d) Data transformation;
- (e) inter - action with the user.

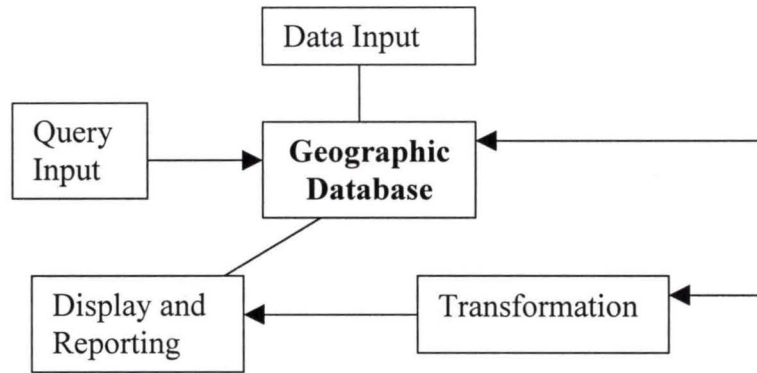


Fig. 7

Main software components of a GIS

Hardware - Hardware for GIS is classified according to their capacity and sizes such as:-

1. Microcomputers;
2. Minicomputers;
3. Mainframe computers.

Computer hardware (Microcomputer)

The general hardware components for a GIS is as presented in fig below.

The computer or the Central processing Unit (CPU) is linked to a disk drive storage unit that provides space for storing data and program.

A digitiser is a device used to convert data from maps and documents into digital form and send same to the computer.

A plotter or other kind of display device used to present the result of the data processing and a tape drive is used for storing data or program on magnetic tape.

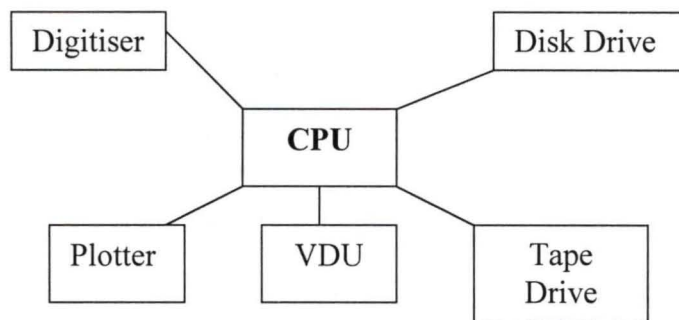


Fig. 8

Main hardware component for GIS.

The user controls the peripherals (a general term for plotters, printers, digitisers are linked to the Computer) via visual display unit (VDU) otherwise known as a terminal. The user's terminal might itself be a Computer or might incorporate special hardware to allow maps to be displayed on the screen quickly.

There is a very wide range of these devices that can be used to fill these general hardware requirements.

3.6 DATABASE DESIGN AND ANALYSIS.

In order to design a database system we have to create an image of the real world in the Computer memory and provide the means to retrieve it.

To represent a feature in the Computer in a comprehensive way two types of data are required (1) Positional or graphic data and (2) attribute or Semantic data. The positional representation should describe the position of a feature and eventually its shape and size, while attribute data should give all other properties of the feature.

For instance in this project, as in a case of Cadastral Parcel of land where the position, size are determined by the co-ordinates of the corner points and its attribute will include the name of owner use etc.

3.7 RELIABILITY OF CHOSEN PROGRAMMING LANGUAGE.

Programming language is the process of communication or ways of executing the program for the implementation of the project. The reliability of the chosen programming language base on which best of the language could be used for the project. Therefore the language best fitted for this project is one of the database management system languages called the database IV and the choice for this language is base on the fact that the language is very flexible and general

acceptable by different users of the database management system language.

In view of this database IV has a set of dbase IV command designed to perform a particular task like this one. These commands are stored in a file known as dbase IV as command file. In conclusion the choice for dbase IV as a programming language in this project is that it is easy to use.

3.8. **COST ANALYSIS AND BENEFITS**

A cost -benefit analysis is necessary to determine economic feasibility and to see best how the project research can be able to advice the management of the organisation to consider the change from manual system of land allocations to Computer base system in order to check the issue of double allocation of parcel of land within the FCT hence the primary objective of cost benefit analysis is to find out whether it is economically worthwhile to invest in the project.

In course of this research project certain elements of the cost was recommended to the management, which includes.

(a) Equipment cost which is:

- Hardware at the cost of ₦150,000.00 each (3 numbers)
₦450,000.00

- Printers (Laser jet) ₦50,000.00 each (2 numbers)
₦100,000.00

- UPS at the cost of ₦30,000.00 each (2 numbers)
₦60,000.00

- Stabilisers at the cost of ₦25,000.00 each (3 numbers)
₦75,000.00

Sub Total - ₦535,000.00

(b) Installation Cost (New building if necessary i.e. the Computer room.

(c) Development cost which includes -

Software Consultancy - ₦80,000.00

Change over cost - ₦150,000.00

(d) Personnel cost which includes-

Staff training - ₦150,000.00

Staff recruitment - ₦80,000.00

Staff Salaries - ₦200,000.00

Allowance & Pension - ₦100,000.00

Miscellaneous - ₦50,000.00

Sub Total = ₦580,000.00

(e) Operating cost includes-

Consumable materials (tape, card, disk) - ₦20,000.00

Maintenance cost - ₦50,000.00

Accommodation cost - ₦150,000.00

Insurance/power/telephone - ₦300,000.00

Sub total = ₦500,000.00

Grand Total = ₦500,000.00

580,000.00

23,000.00

535,000.00

1.638000.00

₦1.6m

Benefits

During the course of this research project the benefit that will be determined after changeover base on the cost analysis represented above shows the following benefits will includes the following:-

- Retrieval of information about plots allocated becomes easy.
- Giving a proper and update record keeping.
- Information sharing between the various units of the department will easy and help in management decision.

CHARTER FOUR

SOFTWARE DEVELOPMENT AND IMPLEMENTATION

4.1 Principles of good Programming Technique.

A program is defined as series of instructions give in a computer to perform a specific task. However, certain laid down rules must be followed such program. Rules of programming can vary from software to software and can be simple or complex.

Until Twenty years ago Computer programs were generally designed and written in an ad-hoc fashion. However, over the last few decades, some ground rules for the construction of goods programs have been laid down.

They include:

1. Establish and use a standard, easily recognisable way of expressing problem solutions (structured programming).
2. Design algorithms in stages, starting with a rough outline of the algorithm, and successively introducing more detail (Top-down programming).
3. Divided an algorithms into separate chunks (modules) and deal with each module separately.
4. Give data a central role in algorithm design.
5. Describe fully and clearly what each algorithm does and how it does it (documentation).

6. Design and use test data in a systematic manner.

As such rules were developed, a great similarity between the design of programs and normal engineering design techniques was noted, and the term software engineering was coined to describe this approach.

4.1.1 **CHARACTERISTICS OF GOOD PROGRAM**

The following items are identified as the characteristic of good programs.

4.2. **Executable and Correctness.**

A good program must be correct. The program should carry out the task it was designed to do without error. In order to achieve this objective, a complete and clear specification of the purpose and functions, of the program must be obtained. Thus, program errors can be due to outright mistakes on the part of a programmer or to a lack of a clear description regarding the required output of the program.

4.2.1 **Understandability**

A good program must be understandable.

Although a computer program is a set of instructions for a computer, it should also be comprehensible to other people. A person other than

the author should be able to read and understand the purpose and functions of the program.

High-level programming languages such as PASCAL are intended for human use and interpretation in their direct form and are intended for machine use only indirectly through compilation.

4.2.2 Easy to change

Changes in products, changes in company procedures, new government regulations and the like all lead to the necessity of modifying existing computer programs. As a consequence, most established computer installations devote considerable time and effort to changing existing programs. Thus, a good program not only fulfils its original purpose, but also easily adaptable in response to a changing environment.

4.2.3 The Program must be Efficiently Written.

This concerns the amount of time spent in writing the program. This objective is secondary to the program being correct, the easiest way to write a program quickly is to write it partly correct leave it difficult to understand, or allows its obscurity to make it difficult to change. Still, the principal cost of programming project is the programmer's time

and programming techniques which economise this time while still satisfying the objectives that the program be correct, understandable and easy to change are preferred.

4.2.4 Executable

A good program must execute efficiently. The program should be so written that it does not use more computer storage or more computer processing time than is necessary. Again, this objective is also secondary to the primary objectives that a program is correct, understandable and easy to change.

A program should however be alert to the techniques by which efficient program execution can be achieved.

4.3 ALGORITHMS

An algorithms can be defined as a set of unambiguous rules that define how a particular problem or class of problems can be solved in a finite sequence of steps. In other words, algorithms is a finite set (or sequence) of instructions (or operator) for carrying out a specific procedural task.

On the other hand, a program is an algorithm specifically expressed in a high level language capable of execution by a computer.

Generally, algorithms are expressed in flow charts, pseudocodes, decision tree, English and so on which are not suitable for execution by computer.

4.3.1 Characteristics of Algorithm.

1. **Definiteness:-**

Each instruction in the list (sequence of instructions) must be clear and unambiguous. That is, an algorithm should be precise.

2. **Effectiveness:-**

Execution of an impossible task must be voided such as finding the value of $\sqrt{2}$ with an accurate pre-operation be definite as in (1) above, but it also be feasible (i.e. executable).

3. **Finiteness:-**

Algorithms must terminate after a finite number of steps. In other words, there must be an exact number or finite number of instructions in an algorithm.

4. **Termination:-**

There must be a stopping criterion to terminate an algorithm especially for an instruction with repeated execution.

5. **Output:-**

An algorithm should provide an output of implementation.

the symbol we put a brief concise description, in plain English, of the operation to be performed. The BASIC INPUT and PRINT statements are symbolised by the input output symbol.

The process symbol, a rectangle, is used for operations that take place within the main processor. Calculations are examples of such operations. Like the INPUT/OUTPUT symbol, the process symbol has one line going in and one going out. Let and LEAD statements are symbolised by the process symbol.

4.5. Some Rules for Flowcharting

1. Use symbols for proper operations with the correct number of lines in and lines out.
2. Use plain English rather than some esoteric, unreadable code or shorthand.
3. If there is any doubt about way a line is going, use arrows.
4. Be consistent in your language, especially when referring to specific quantities. If you call it GROSS in one part of your flow chart, don't call it Total some where else.
5. Be neat, please.

4.5.1 Flowchart for the program it's self.

4.6. Module and procedures.

We may wish to recall that the project is all about Geographical Information System (GIS) and in the project, a program has been

The print module allows the user to direct the out put request to the printer for external use. Finally the Exit module allows the user to quit this program.

4.7 **ACCESS AND SECURITY.**

Access to the system is restricted by password to restrict initial and subsequent access for selected changes to information on files that are very sensitive or viewing records inside these files.

The restriction will help to check the integrity of the files and enhance good and reliable records since it is only the Computer Operator who knows the password are allow to access the system thereby reducing too many access to the records.

written to assist in minimising even if not totally solving the problem of double allocation of land in FCT Abuja. In other words, the program is written to help the staff of FCDA in avoiding the problem of allocating the same piece of land to at least two different persons in the same area.

The program consists of six modules and they include new allocation, Modify record, Erase record, Enquiry, Report and Exit modules. The new allocation module takes care of allocating a particular plot to person. Here, if this land has been allocated to any other person before, the program lets the user know by bringing out a message that reads "This plot has been allocated, O.K". Similarly, if two different plots are to be allocated to one person in the same zone, the program prints the message "This person has been allocated a plot in this zone O.K". The modify record module enables the user to change any of the fields involved in the problem if he discovers that he has wrongly entered an information.

Erase record modules allows the user to delete any information that is no longer needed by the user while the enquiry module makes it possible for the user to enquire an information about a particular plot or person.

Generally, algorithms are expressed in flow charts, pseudocodes, decision tree, English and so on which are not suitable for execution by computer.

4.3.1 Characteristics of Algorithm.

1. **Definiteness:-**

Each instruction in the list (sequence of instructions) must be clear and unambiguous. That is, an algorithm should be precise.

2. **Effectiveness:-**

Execution of an impossible task must be voided such as finding the value of π with an accurate pre-operation be definite as in (1) above, but it also be feasible (i.e. executable).

3. **Finiteness:-**

Algorithms must terminate after a finite number of steps. In other words, there must be an exact number or finite number of instructions in an algorithm.

4. **Termination:-**

There must be a stopping criterion to terminate an algorithm especially for an instruction with repeated execution.

5. **Output:-**

An algorithm should provide an output of implementation.

4.4 Flow Chart

It is said that “A picture is worth a thousand words” and so it is with programs. It is much easier to understand the flow than if we hear a description.

A Flowchart is a diagram of a process. It consists of symbols, indicating operations; and connecting lines indicating how the process moves from operation to operation. Differently shaped symbols are used for different types of operations.

The terminal symbol, an oval is used at the beginning of a program, the symbol will have the word START in it and one line leading out of it to the first operation of the program. The terminal symbol at the end of the program will have the word STOP in it and one line leading into it. There can be no line leading out of the STOP symbol because the process stops at that point. A properly structured flowchart will have one START and one STOP symbol.

The INPUT/OUTPUT symbol, a parallelogram, is used for operations that communicates between the main processor and sometimes outside. Keyboard inputs or displayed or printed outputs are examples of such operations. The symbol has one line going into it (from the previous operation) and one going out (to the next operation). Inside

CHAPTER FIVE

DOCUMENTATION AND MAINTENANCE

5.1 Program Testing.

When a program is written, it is normally tested in order to see whether the program will work according to the required needs of the program and also to make correction where necessary, therefore the program for this research project has been tested and found okay.

5.2 Computer Program Source Code

This is the situation or condition, which involves the transformation of program design into programming instructions using a particular computer language and also it involves entering such program instructions into the computer.

5.3 Documentation

Documentation can be defined as the process of describing how a program works and there are two major type of Documentation namely Internal Documentation and External Documentation.

- Internal Documentation is the way of adding comments into the program and it is good to note that all the programming languages have facilities for adding comments into the program writing such that the comments are not access by the compiler.

- External documentation on other hand it serve as reference manual which describe the ways or methods of interacting with the program as well as the methods requires to solve any anticipated problems

5.4 The Importance of Documentation

The Importance of Documentation in program writing can not be over emphasised, this is because the documentation help in trying to describe how best the program can work in order to solve the intended problems.

It also serves as a reference manual for other programmers, which it can be of help in writing their own programs in a particular program language. It also describes the ways of interacting with the program, which is required to solve an anticipated problem.

5.5 Difficulties and Constraints of GIS Implementation

The main difficulties of GIS implementation are as a result of the cost associated with the hardware and the software for GIS. This items especially from the initial purchase of computer hardware and the various software packages.

Secondly lack of awareness of the global importance attached to GIS in solving most our daily problems.

Another constraints are the lack of necessary software that will be used to transform and adopt the existing data generated manually.

5.6 System Recommendation

In order to achieve effective and reliable efficient ways of land allocation and to reduce allocation mixed up within the Dept. of Land Planing and Survey FCDA Abuja for record keeping and retrieval, then a computerised information system is proposed for the above organisation which will involve purchase of a computer system and training of staff personnel and also greater degree of system investigation.

I reckon that a microcomputer system (PC) should be purchased.

This recommendation is based on the following transaction.

- (i) The volume of activities as represented by the member of input document.
- (ii) The processing requirements, which would be largely, batch processing basis.
- (iii) The volume, number of output document and reports.

CONCLUSION

5.7 This research project has describe the design and implementation of land allocation or land allocation mixed up in FCT.

The project started by studying the procedures and concepts involved in the manual land allocation within FCT.

In order to get a reasonable set of design objectives, I have considered important features that can be built into the land allocation committee and which make the project feasible and reliable. In design stage for the allocation and mixed - up in land within the FCT. The analysis considered five.

(5) Modules which were design and the program implemented in Dbase IV Land allocation program is designed though within a short period but it has been tested and implemented I believe that the system evolution or charges is a continues process, therefore with amendments, charges and program overhead until organisational legal and social needs are satisfied leading to system evolution.

This project indicates that Land allocation program could be attractive idea for keeping land records for future retrieval and updating.

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APPENDICES

SET STATUS OFF

SET TALK OFF

SET SCORE OFF

SET ECHO OFF

SET CENTURY ON

DO PERSONAL

DO MAIN DEF

DO TITLE

ACTIVE POPUP MAINMENU

*SET STATUS ON

*SET TALK ON

:SET SCORE ON

*SET ECHO ON

PROCEDURE PERSONNAL

CLEA

@5,10 TO 18, 70 DOUBLE

@7,14 SAY " GEOGRAPHICAL INFORMATION SYSTEM (GIS)"

@8,14 SAY " ON LAND ALLOCATION"

@9, 14 SAY " {A CASE STUDY OF FEDERAL CAPITAL DEVELOPMENT
AUTHORITY} "

@10, 14 SAY " (FCDA), ABUJA"

@13, 14 SAY " A FINAL PROJECT BY"

@15, 14 SAY " BILSHAKKA STEVE"

@16, 14 SAY " PGD/MCM/98/99/734"

@22, 18 SAY " "

WAIT "PRESS ENTER key to cont ..."

RETURN

PROCEDURE MAIN _ DEF

DEFINE POPUP MAINMENU FROM 7, 27 TO 15, 60

DEFINE BAR 1 OF MAINMENU PROMPT " ===== MAIN

MENU===== " SKIP

DEFINE BAR 2 OF MAINMENU PROMPT " NEW ALLOCATION

";

MESSAGE "Allocate land to fresh applicant (s) "

DEFINE BAR 3 OF MAINMENU PROMPT " MODIFY RECORD (S)

";

MESSAGE "Make changes to existing records (s) "

DEFINE BAR 4 OF MAINMENU PROMPT " ERASE RECORD (S)

";

MESSAGE "Make changes to existing record (s) "

DEFINE BAR 5 OF MAINMENU PROMPT " ENQUIRY

";

MESSAGE "Make enquiry about unallocated land"

DEFINE BAR 6 OF MAINMENU PROMPT " REPORT

";

MESSAGE "Output report to screen, printer or file"

DEFINE BAR 7 OF MAINMENU PROMPT " EXIT

";

MESSAGE "Leave the program"

ON SELECTION POPUP MAINMENU DO MAIN

RETURN

PROCEDURE MAIN

DO CASE

CASE BAR () = 2

DO ADDREC

CASE BAR () = 3

DO MODIFREC

CASE BAR () = 4

DO DELREC

CASE BAR () = 5

DO ENQREC

CASE BAR () = 6

DO REPREC

CASE BAR () = 7

CLEA

QUIT

ENDCASE

RETURN

PROCEDURE TITLE

CLEAR

SET CLOCK TO .1, 60

@1, 12 SAY DATE ()

@2, 24 TO 5, 60 DOUBLE COLOR R+

@2, 23 FILL TO 5, 61 COLOR W+/B+

SET COLOR TO R+/B+

@3, 27 SAY "GEOGRAPHICAL INFORMATION SYSTEM"

@3,27 SAY "ON LAND ALLOCATION, FCDA, ABUJA"

SET COLOR TO

@17, 10 TO 20, 70

@18, 20 SAY "Use the UP and DOWN ARROW keys to make
selection"

@19, 20 say " and press ENTER key

SET COLOR TO

RETURN

* THIS IS FOR THE HEADING *

PROCEDURE HEAD

SET COLOR TO W+/B+,,R+

CLEA

@1, 8 SAY DATE ()

SET CLOCK TO 1, 62

@2, 0 TO 2, 19 DOUBLE

@2, 61 TO 2, 79 DOUBLE

@0, 20 TO 5, 60 PANEL

@2, 25 SAY "GEOGRAPHICAL INFORMATION SYSTEM"

@3, 25 SAY "ON LAND ALLOCATION, FCDA, ABUJA"

RETURN

* THIS IS FOR ADDING RECORD OR NEW ALLOCATION*

PROCEDURE ADREC

ANS ="Y"

DO WHILE ANS="Y"

DO HEAD

USE LAND

@7, 30 SAY "NEW ALLOCATION"

@8, 0 TO 8, 79 DOUBLE

@9, 10 TO 19, 70

@13, 11 TO 13, 69

@14, 11 FILL TO 18, 69 COLOR W+/GR+

STORE SPACE (30) TO MAPPNAME

STORE SPACE (10) TO MSTOREG

STORE SPACE (8) TO MCAZON

STORE SPACE (20) TO MRON

STORE SPACE (30) TP MAPPADD1

STORE SPACE (30) TO MAPPADD2

STORE 0 TO MPLOTNO

STORE 0 TO MPLOTNO

STORE CTOD (" / / ") TO MDATE

@11, 12 SAY "GET MCAZON PICT "@ ! "

@11, 40 SAY "PLOT NUMBER: " GET MPLOTNO PICT "9999999999"

@12, 12 SAY "APPLICANTS' NAME: " GET MAPPNAME PICT "@ ! "

READ

MCAZON=UPPER (MCAZON)

MAPPNAME=UPPER (MAPPNAME)

SET COLOR TO W+/GR+ , , R+

LOCATE ALL FOR CAZON=MCAZON .AND. PLOTNO . OR.

APPNAME=MAPPNAME

IF FOUND ()

IF CAZON=MCAZON .AND. PLOTNO=MPLTNO

@15, 20 SAY "This Plot has been allocated, O.K"

@16, 20 SAY "Press ENTER key"

WAIT ""

ELSE

@15, 20 SAY "This Person has been allocated in this

zone, O.K"

@16, 20 SAY "Press ENTER key"

WAIT ""

ENDIF

ELSE

@14, 12 SAY "ADRESS:" GET MAPPADD1 PICT "@ ! "

@15, 21 GET MAPPADD2 PICT "@ ! "

@16, 12 SAY "STATE OF ORIGIN : " GET MSTOREG PCIT "@ ! "

@17, 12 SAY "DATE OF ALLOCATION: "GET MDATE

```
@18, 12 SAY "RIGHT OF OCCUPANCY NO. : " GET MRON PICT
"XXX/XXX/XX. 999999999"

READ

MRON=UPPER (MRON)

APPEND BLANK

REPLACE CAZON WITH MCAZON, PLOTNO WITH MPLOTNO,
APPNAME WITH MAPPNAME

REPLACE APPADD1 WITH MAPPADD1, APPADD2 WITH MAPPADD2

REPLACE STORIG WITH MSTORIG, DATE WITH MDATE, RON WITH
MRON

ENDIF

SET COLOR TO W+/B+ , , R+

@20, 20 TO 22, 57

@21, 22 SAY "Are there more allocations? (Y/N) " GETS ANS PICT
"! "

READ

ENDDO

CLOSE DATABASE

SET COLOR TO

DO TITLE

RETURN
```

* THIS IS FOR MODIFICATION OF RECORD (S) OR ALLOCATED LAND*

PROCEDURE MODIFREC

ANS2="Y"

DO WHILE ANS2="Y"

DO HEAD

USE LAND

@7, 30 SAY "MODIFY ALLOCATED LAND"

@8, 0 TO 8, 79 DOUBLE

@9, 10 TO 19, 70

@12, 11 TO 12, 69

STORE SPEACE (8) TO MCAZON

STORE 0 TO MPLOTNO

@11, 12 SAY "ADASTRAL ZONE : " GET MCAZON PICT " @! "

@11, 40 SAY "PLOT NUMBER: " GET MPLOTNO PICK "9999999999"

READ

MCAZON+UPPER (MCAZON)

LOCATE ALL FOR CAZON=MCAZON .AND. PLOTNO=MPLOTNO

IF .NOT. FOUNFD ()

@15, 20 SAY "This Plot has NOT BEEN ALLOCATED, O.K"

@16, 20 SAY "Press ENTER key"

WAIT " "

ELSE

STORE APPNAME TO MAPPNAME

STORE STORIG TO MSTORIG

STORE RON TO MRON

STORE APPADD1 TO MAPPDD1

STORE APPADD2 TO MPPDD2

STORE DATE TO MDATE

@13, 12 SAY "APPLICANTS' NAME: " GET MAPPNAME PICT "@!"

@14, 12 SAY "ADDRESS : " GET MAPPADD1 PICT "@!"

@15, 21 GET MAPPADD2 PICT "@!"

@16, 12 SAY "STATE OF ORIGIN : " GET MSTORIG PICT "@!"

@17, 12 SAY "DATE OF ALLOCATION: "GET MDATE

@18, 12 SAY "RIGHT OF OCCUPANCY NO. : " GET MRON PICT

"XXX/XXX/XX . 999999999"

READ

MRON=UPPER (MRON)

REPLACE CAZON WITH MCAZON, PLOTNO WITH MPLOTNO,
APPNAME WITH MAPPNAME

REPLACE APPADD1 WITH MAPPADD1, APPADD2 WITH MAPPADD2

```
REPLACE STORIG WITH MSTORIC, DATE WITH MDATE, RON WITH
MRON
ENDIF
@20, 20 TO 22, 59
@21, 22, SAY "Are there more modifications? (Y/N)" GET ANS2
PICK " ! "
READ
ENDDO
CLOSE DATABASE
SET COLOR TO
DO TITLE
RETURN
```

```
*****
```

```
* THIS FOR DELETION OF RECORD (S) OR ALLOCATED LAND*
```

```
*****
```

```
PROCEDURE DELREC
```

```
ANS3="Y"
```

```
DO WHILE ANS3="Y"
```

```
DO HEAD
```

```
USE LAND
```

```
@7, 30 SAY "ERASE ALLOCATED LAND"
```

```
@8, 0 TO 8, 79
```

@9, 10 TO 19, 70

@12, 11 TO 12, 69

STORE SPACE (8) TO MCAZON

STORE 0 TO MPLOTNO

@11, 12 SAY "CADASTRAL ZONE : "GET MCAZON PICT "@ !"

@11, 40 SAY "PLOT NUMBER: "GET MPLOTNO PICT "9999999999"

READ

MCAZON=UPPER (MCAZON)

LOCATE ALL FOR CAZON=MCAZONE .AND. PLOTNO=MPLOTNO

IF .NOT. FOUND ()

 @15, 20 SAY "This Plot has NOT been allocated, O.K"

 @16, 20 say "Press ENTER key"

 WAIT ""

ELSE

 STORE APPNAME TO MAPPNAME

 STORE STORIG TO MSTORIG

 STORE RON TO MRON

 STORE APPADD1 TO MAPPADD1

 STORE APPADD2 TO MAPPADD2

 STORE DATE TO MDATE

@13, 12 SAY "APPLICANTS' NAME: "GET MAPPNAME PICT "@!"

@14, 12 SAY "ADDRESS: " GET MAPPADD1 PICT "@!"

@15, 21 SAY " GET MAPPADD2 PICT "@!"

@16, 12 SAY "STATE OF ORIGIN : "GET MSTORIG PICT "@!"

@17, 12 SAY " DATE OF ALLOCATION: "GET MDATE

@18, 12 SAY "RIGHT OF OCCUPANCY NO. : " GET MRON PICT

"XXX/XXX/XX. 999999999"

MRON=UPPER (MRON)

CLEAR GETS

STORE "N" TO ANNS

@20, 20 TO 22, 65

@21, 22 SAY "Do you want to DELETE this record? (Y/N)"

GET ANNS PICT "!"

READ

IF ANNS = "Y"

DELETE

PACK

@23, 15 SAY "Record Successfully deleted, Press ENTER key"

ELSE

@23, 15 SAY "Press ENTER key"

ENDIF

WAIT ""

ENDIF

@20, 2 CLEAR TO 23, 79

@20, 20 TO 22, 59

@21, 22 SAY "Delete more record (s)? (Y/N)" GET ANS3 PICT "!"

READ

ENDDO

CLOSE DATABASE

SET COLOR

DO TITLE

RETURN

THIS FOR ENQUIRY

PROCEDURE ENQREC2

ANS4="Y"

DO WHILE ANS4="Y"

DO HEAD

USE LAND

@7, 25 SAY "INFORMATION ABOUT LAND ALLOCATED"

@8, 0 TO 8, 79 DOUBLE

@9, 10 TO 19, 70

@12, 11 TO 12, 69

STORE SPACE TO MCAZON

STORE 0 TO MPLOTNO

@11, 12 SAY "CADASTRAL ZONE : "GET MCAZONE PICT "@ !"

@11, 40 SAY "PLOT NUMBER: "GET MPLOTNO PICT "9999999999"

READ

MCAZON=UPPER (MCAZON)

LOCATE ALL FOR CAZON .AND. PLOTNO=MPLOTNO

IF .NOT. FOUND ()

 @15, 20 SAY "This record does not exist, O.K"

 @16, 20 SAY "Press ENTER key"

 WAIT ""

ELSE

 STORE APPNAME TO MAPPNAME

 STORE STORIG TO Mstorig

 STORE RON TO MRON

 STORE APPADD1 TO MAPPADD1

 STORE APPADD2 TO MAPPADD2

 STORE DATE TO MDATE

 @13, 12 SAY "APPLICANTS' NAME: "GET MAPPNAME PICT "@ !"

 @14, 12 SAY " ADDRESS:" GET MAPPADD1 PICT "@ ! "

 @15, 21 GET MAPPADD2 PICT "@ ! "

 @16, 12 SAY "STATE OF ORIGIN : " GET Mstorig PICT "@ ! "

@17, 12 SAY "DATE OF ALLOCATION: "GET MDATE

@18, 12 SAY "RIGHT OF OCCUPANCY NO. : "GET MRON PICT

"XXX/XXX/XX. 999999999"

MRON=UPPER (MRON)

CLEAR GETS

ENDIF

@20, 20 TO 22, 29

@21, 22 SAY "More enquire (Y/N)" GET ANS4 PICT " ! "

READ

ENDDO

CLOSE DATABASE

SET COLOR TO

DO ENQREC

RETURN

* THIS IS THE SUBMENU FOR THE ENQUIRY*

PROCEDURE ENQREC

DO WHILE .T.

SET COLOR TO W+/B+ , , R+

CLEAR

@4, 20 TO 15, 65 DOUBLE

@5, 40 SAY "ENQUIRY"

@6, 21 TO 6, 64

@8, 22 SAY "[1] INFORMATION ABOUT LAND ALLOCATED"

@9, 22 SAY "[2] ENQUIRY ABOUT PREVIOUS ALLOCATIONS"

@10, 22 SAY "[3] LAND YET TO BE ALLOCATED"

@11, 22 SAY "[4] EXIT TO MAIN MENU "

STORE 0 TO CHOICE

@14, 30 SAY "Enter your choice (1-4) : "GET CHOICE PICT "9"

RANGE 1,4

READ

DO CASE

CASE CHOICE = 1

DO ENQREC2

CASE CHOICE = 2

DO ENQPRE

CASE CHOICE = 3

DO LANDYET

CASE CHOICE = 4

SET COLOR TO

DO TITLE

RETURN

ENDCASE

ENDDO
SET COLOR TO
DO TITLE
RETURN

* ENQUIRY ON PREVIOUS ALLOCATION*

PROCEDURE ENQPRE

ANS8="Y"

DO HEAD

USE LAND

@7, 25 SAY "INFORMATION ON PREVIOUS ALLOCATIONS"

@8, 0 TO 8, 79 DOUBLE

@9, 10 TO 19, 70

@12, 11 TO 12, 69

STORE SPACE (30) TO MAPPNAME

@11, 27 SAY "NAME: "GET MAPPNAME PICT " @! "

READ

MAPPNAME=UPPER (MAPPNAME)

LOCATE ALL FOR APPNAME=MAPPNAME

IF .NOT. FOUND ()

```
@15, 20 SAY "This record does not exist, O.K"

@16, 20 SAY "Press ENTER key ...."

WAIT"

ELSE

STORE PLOTNO TO MPLOTNO

STORE CAZON TO MCAZON

STORE STORIG TO MSTRORIG

STORE RON TO MRON

STORE APPADD1 TO MAPPADD1

STORE APPADD2 TO MAPPADD2

STORE DATE TO MDATE

@13, 12 SAY "CADASTRAL ZONE : " GET MCAZON PICT " @ !"

@13, 42 SAY "PLOT NUMBER: " GET MPLOTNO PICT

"9999999999"

@14, 12 SAY "ADDRESS : " GET MAPPADD1 PICT "@ !"

@15, 21 GET MAPPADD2 PICT " @ !"

@16, 12 SAY "STATE OF ORIGIN : " GET MSTRORIG PICT " @ !"

@17, 12 SAY "DATE OF ALLOCATION: "GET MDATE

@18, 12 SAY "RIGHT OF OCCUPANCY NO. : " GET MRON PICT

"XXX/XXX/XX . 9999999999"

MRON=UPPER (MRON)

CLEAR GETS

ENDIF
```

@20, 20 TO 22, 59

@21, 32 SAY "More enquire (Y/N) " GET ANS8 PICT "!"

READ

ENDDO

CLOSE DATABASE

SET COLOR TO

DP ENQREC

RETURN

THIS IS FOR REPORT

PROCEDURE SELECTOUT

SET ALTERNATE ON

STORE 0 TO CCHOICE

STORE SPACE (12) TO MFILE

CLEA

@5, 16 TO 20, 64 PANEL

@7, 35, SAY "OUTPUT MENU"

@8, 17 TO 8, 63 DOUB

@12, 25 SAY "[1] . . . SEND OUTPUT TO SCREEN"

@14, 25 SAY "[2] . . . SEND OUTPUT TO PRINTER"

@16, 25 SAY "[3] . . . SEND OUTPUT TO FILE"

```
@18, 30 SAY "Enter choice ( 1 -3) : " GET CCHOICE PICT "9"

RANGE 1,3

READ

IF CCHOICE = 1

    SET ALTERNATIVE TO "CON"

ELSE

    IF CCHOICE = 2

        SET ALTERNATE TO "PRN"

    ELSE

        IF CCHOICE = 3

            @19, 25 SAY "ENTER FILENAME: "GET MFILE PICT "@ !"

            READ

            SET ALTERNATE TO MFILE

        ENDIF

    ENDIF

ENDIF

RETURN

*****

PROCEDURE REPREC

OK="Y"

DO WHILE OK="Y"

STORE 0 TO CCHOICE2

CLEA
```

@5, 16 TO 16, 64 DOUB

@6, 35 SAY "REPORT MENU

@7, 17 TO 7, 63 PANE

@8, 25 SAY "[1] . . . INDIVIDUAL REPORT"

@10, 25 SAY "[2] . . . SUMMARY "

@12, 25 SAY "[3] . . . EXIT TO MAIN MENU"

@14, 30 SAY "Enter choice (1 - 3) : " GET CCHOICE2 PICT "9"

READ

DO CASE

 CASE CCHOICE2 = 1

 DO SELECTOUT

 DO REPORT1

 CASE CCHOICE2 = 2

 DO SELECTOUT

 DO REPORT2

 CASE CCHOICE2 = 3

 DO TITLE

 RETURN

ENDCASE

OK="N"

ENDDO

RETURN

PROCEDURE REPORT1

ANS10="Y"

DO WHILE ANS10="Y"

DO HEAD

USE LAND

@7, 25 DAY "INDIVIDUAL REPORT"

@8, 0 TO 8, 79 DOUBLE

@9, 10 TO 19, 70

@12, 11 TO 12, 69

STORE SPACE (30) TO MAPPNAME

@11, 27 SAY "NAME: " GET MAPPNAME PICT "@!"

READ

MAPPNAME=UPPER (MAPPNAME)

LOCATE ALL FOR APPNAME=MAPPNAME

IF .NOT. FOUND ()

 @15, 20 SAY "This record does not exist, O.K"

 @16, 20, SAY "Press ENTER key ..."

 WAIT ""

ELSE

 STORE PLOTNO TO MPLOTNO

 STORE CAZON TO MCAZON

 STORE STORIG TO MSTORIG

STORE RON TO MRON

STORE APPADD1 TO MAPPADD1

STORE APPADD2 TO MAPPADD2

STORE DATE TO MDATE

@13, 12 SAY "CADASTRAL ZONE : " GET MCAZON PICT "@!"

@13, 42 SAY "PLOT NUMBER: " GET MPLOTNO PICT

"9999999999"

@14, 12 SAY "ADDRESS: " GET MAPPADD1 PICT "@!"

@15, 21 GET MAPPADD2 PICT "@!"

@16, 12 SAY "STATE OF ORIGIN : " GET MSTORIG PICT "@!"

@17, 12 SAY "DATE OF ALLOCATION: "GET MDATE

@18, 12 SAY "RIGHT OF OCCUPANCY NO. : " GET MRON PICT

"XXX/XXX/XX. 999999999"

MRON=UPPER (MRON)

CLEAR GETS

ENDIF

@20, 20 TO 22, 59

@21, 32 SAY "More Report (Y/N)" GET ANS10 PICT "!"

READ

ENDDO

CLOSE DATABASE

SET COLOR TO

DO REPREC

RETURN

PROCEDURE REPORT2

USUAL="Y"

DO WHILE USUAL="Y"

DO HEAD

USE LAND

@7, 25 SAY "SUMMARY OF REPORT"

@8, 0 TO 8, 79 DOUBLE

@9, 1 SAY "S/N NAME : CADASTRAL ZONE :PLOT NO. : STATE OF

ORIGIN: ADRESS DATE"

@10, 0 TO 10, 79

GO TOP

K=11

P=K-10

DO WHILE .NOT. EOF ()

@K, 2 SAY P

@K, 3 SAY APPNAME

@K, 25 SAY CAZON

@K, 28 SAY PLOTNO

@K, 40 SAY STORIG

@K, 48 SAY APPADD2


```
@K, 69 SAY DATE  
  
SKIP  
  
P = P + 1  
  
K = K + 1  
  
IF K >= 22  
    WAIT  
    @11, 1 CLEAR TO 23, 79  
  
K = 11  
  
ENDIF  
  
LOOP  
  
ENDDO  
  
WAIT  
  
SET COLOR TO  
  
DO REPREC  
  
USUAL="N"  
  
ENDDO  
  
RETURN
```

OUTPUT

AUTHENTICATION

AUTHENTICATION

Invalid Password!

Unauthorized user is not allowed! O.K

TER key...

AUTHENTICATION

Invalid Password!

Unauthorized user is not allowed! O.K

TER key...

2

AUTHENTICATION

Authenticated!

ENTER key...

AUTHENTICATION

Authenticated!

ENTER key...

3

GEOGRAPHICAL INFORMATION SYSTEM (GIS)
ON LAND ALLOCATION
{A CASE STUDY OF FEDERAL CAPITAL DEVELOPMENT AUTHORITY}
(FCDA), ABUJA

A FINAL PROJECT BY

BILSHKKA STEVE
PGD/MCS/98/99/734

TER key to cont...

GEOGRAPHICAL INFORMATION SYSTEM (GIS)
ON LAND ALLOCATION
{A CASE STUDY OF FEDERAL CAPITAL DEVELOPMENT AUTHORITY}
(FCDA), ABUJA

A FINAL PROJECT BY

BILSHKKA STEVE
PGD/MCS/98/99/734

TER key to cont...

23/07/2000

3:37:44 pm

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ALLOCATION, FCDA, ABUJA

=====MAIN MENU=====
NEW ALLOCATION
MODIFY RECORD(S)
ERASE RECORD(S)
ENQUIRY
REPORT
EXIT

Use the UP and DOWN ARROW keys to make selection
and press ENTER key

Remove existing record(s)

23/07/2000

3:37:46 pm

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ALLOCATION, FCDA, ABUJA

=====MAIN MENU=====
NEW ALLOCATION
MODIFY RECORD(S)
ERASE RECORD(S)
ENQUIRY
REPORT
EXIT

Use the UP and DOWN ARROW keys to make selection
and press ENTER key

Remove existing record(s)

23/07/2000

3:37:48 pm

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ALLOCATION, FCDA, ABUJA

=====MAIN MENU=====
NEW ALLOCATION
MODIFY RECORD(S)

(5)

7/2000

4:43:34 pm

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ADMINISTRATION, FCDA, ABUJ

NEW ALLOCATION

ADASTRAL ZONE: A6 PLOT NUMBER: 14
PPLICANTS' NAME: ALICE STEPHEN

DDRESS: BOSSO MARKET, MINNA
TATE OF ORIGIN: PLATEAU
ATE OF ALLOCATION: 23/07/2000
IGHT OF OCCUPANCY NO.: FCT/ABU/PL 01

Are there more allocations? (Y/N) Y

/07/2000

4:43:34 pm

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ADMINISTRATION, FCDA, ABUJ

NEW ALLOCATION

ADASTRAL ZONE: A6 PLOT NUMBER: 14
PPLICANTS' NAME: ALICE STEPHEN

DDRESS: BOSSO MARKET, MINNA
TATE OF ORIGIN: PLATEAU
ATE OF ALLOCATION: 23/07/2000
IGHT OF OCCUPANCY NO.: FCT/ABU/PL 01

Are there more allocations? (Y/N) Y

7/2000

4:40:45 pm

**GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ADMINISTRATION, FCDA, ABUJA**

SUMMARY OF REPORT

NAME:	CADASTRAL ZONE:	PLOT NO.:	STATE OF ORIGIN:	ADDRESS:	DATE :
Alice Stephen	A6	420	Plateau	Wuse, Abuja	19/07/2000
Paul Dada	A6	444	Nasarawa	Zone 7, Wuse Abuja	19/07/2000
Nenkimwa Fitka	A6	422	FCT		20/07/2000
John K. Alhassan	A6	50	Kaduna	Abuja	13/07/1999

Press any key to continue ...

7/07/2000

4:40:45 pm

**GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ADMINISTRATION, FCDA, ABUJA**

SUMMARY OF REPORT

NAME:	CADASTRAL ZONE:	PLOT NO.:	STATE OF ORIGIN:	ADDRESS:	DATE :
Alice Stephen	A6	420	Plateau	Wuse, Abuja	19/07/2000
Paul Dada	A6	444	Nasarawa	Zone 7, Wuse Abuja	19/07/2000
Nenkimwa Fitka	A6	422	FCT		20/07/2000
PST. Mike Adejumo	A6	42			13/07/1999
PST Mike Adejumo	A6	43			13/07/1999
John K. Alhassan	A6	50	Kaduna	Abuja	13/07/1999

Press any key to continue ...

4:32:12 pm

OUTPUT MENU

- [1]...SEND OUTPUT TO SCREEN
- [2]...SEND OUTPUT TO PRINTER
- [3]...SEND OUTPUT TO FILE

Enter choice (1-3): 0

4:32:19 pm

OUTPUT MENU

- [1]...SEND OUTPUT TO SCREEN
- [2]...SEND OUTPUT TO PRINTER
- [3]...SEND OUTPUT TO FILE

Enter choice (1-3): 0

23/07/2000

4:30:30 pm

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ALLOCATION, FCDA, ABUJA

ERASE ALLOCATED LAND

CADASTRAL ZONE : B6 PLOT NUMBER: 34

APPLICANTS' NAME: ARC. CAROLINE ADEJUMO
ADDRESS: EXCEL HOUSE
ABUJA
STATE OF ORIGIN : NIGER
DATE OF ALLOCATION: 13/12/2003
RIGHT OF OCCUPANCY NO. : ADR/FGH/PL.3456

Do you want to DELETE this record? (Y/N) Y

Record Successfully deleted, Press ENTER key....

23/07/2000

4:30:32 pm

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ALLOCATION, FCDA, ABUJA

ERASE ALLOCATED LAND

CADASTRAL ZONE : B6 PLOT NUMBER: 34

APPLICANTS' NAME: ARC. CAROLINE ADEJUMO
ADDRESS: EXCEL HOUSE
ABUJA
STATE OF ORIGIN : NIGER
DATE OF ALLOCATION: 13/12/2003
RIGHT OF OCCUPANCY NO. : ADR/FGH/PL.3456

Do you want to DELETE this record? (Y/N) Y

Record Successfully deleted, Press ENTER key....

4:28:27 pm

REPORT MENU	
[1]	...INDIVIDUAL REPORT
[2]	...SUMMARY
[3]	...EXIT TO MAIN MENU
Enter choice (1-3): 0	

4:28:29 pm

REPORT MENU	
[1]	...INDIVIDUAL REPORT
[2]	...SUMMARY
[3]	...EXIT TO MAIN MENU
Enter choice (1-3): 0	

23/07/2000

4:26:01 pm

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ALLOCATION, FCDA, ABUJA

INFORMATION ABOUT LAND ALLOCATED

CADASTRAL ZONE : B7 PLOT NUMBER: 433

This record does not exist, O.K
Press ENTER key....

More enquire (Y/N) Y

23/07/2000

4:26:03 pm

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ALLOCATION, FCDA, ABUJA

INFORMATION ABOUT LAND ALLOCATED

CADASTRAL ZONE : B7 PLOT NUMBER: 433

This record does not exist, O.K
Press ENTER key....

More enquire (Y/N) Y

4:24:28 pm

ENQUIRY

- [1] INFORMATION ABOUT LAND ALLOCATED
- [2] ENQUIRY ABOUT PREVIOUS ALLOCATIONS
- [3] LAND YET TO BE ALLOCATED
- [4] EXIT TO MAIN MENU

Enter your choice (1-4): 0

4:24:31 pm

ENQUIRY

- [1] INFORMATION ABOUT LAND ALLOCATED
- [2] ENQUIRY ABOUT PREVIOUS ALLOCATIONS
- [3] LAND YET TO BE ALLOCATED
- [4] EXIT TO MAIN MENU

Enter your choice (1-4): 0

23/07/2000

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ALLOCATION, FCDA, ABUJA

4:21:08 pm

MODIFY ALLOCATED LAND

CADASTRAL ZONE : B7 PLOT NUMBER: 420

APPLICANTS' NAME: PST. OLUWA TOSIN
ADDRESS: GARKI ZONE 2
WUSE, ABUJA
STATE OF ORIGIN : KWARA
DATE OF ALLOCATION: 19/07/2000
RIGHT OF OCCUPANCY NO. : ADA/DDD/DD.2023

Are there more modifications? (Y/N) Y

23/07/2000

GEOGRAPHICAL INFORMATION SYSTEM
ON LAND ALLOCATION, FCDA, ABUJA

4:21:08 pm

MODIFY ALLOCATED LAND

CADASTRAL ZONE : B7 PLOT NUMBER: 420

APPLICANTS' NAME: PST. OLUWA TOSIN
ADDRESS: GARKI ZONE 2
WUSE, ABUJA
STATE OF ORIGIN : KWARA
DATE OF ALLOCATION: 19/07/2000
RIGHT OF OCCUPANCY NO. : ADA/DDD/DD.2023

Are there more modifications? (Y/N) Y