

**COMPUTARIZED APPROACH TO
THE MAINTENANCE OF HOUSING
ESTATES
(A CASE STUDY OF FEDERAL LOW
COST HOUSING ESTATE OLOJE
ILORIN KWARA STATE)**

BY

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CERTIFICATION

This is to certify that this project work was carried out by Kamaldeen Nuhu in the department of Maths/Computer Science in partial fulfillment of the post graduate diploma in computer Science, Federal University of Technology, Minna.

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DEDICATION

This project is dedicated to Almighty Allah who has given me the opportunity to completed this course successfully and to the officers in my unit for the roles they played in the process of my schooling.

ACKNOWLEDGEMENT

First and foremost, I ascribe the glory, honour and adoration to the Almighty Allah who has helped me hitherto.

I am inevitably indebted to my noble wife Mrs. Wosilat Kamaldeen and my children and my supervisor, Mr. L.N Ezeako whose supervision, hints, facts and lectures have tremendously contributed to the success of my project. I also appreciate the effort of all the lecturers in the Department of Maths/Computer Science and my honourable H.O.D in person of Dr. S.A Reju.

My sincere gratitude also goes to my friends and my brothers who have been given me moral support and strong advises to complete my course work successfully.

I also wish to express my sincere gratitude to my officers for given me the great opportunity to complete my academic work, May God be with every one of us Amen.

Special thanks to my parents.

ABSTRACT

The project is mainly based on computerised approach to the maintenance of Housing Estate where maintenance could be considered as all works undertaking to keep or restore a property to a state of preservation and acceptable standard for its present and intended use.

Therefore various aspect of maintenance operation are highlighted in this project how to carry out maintenance and a case study of about 250 Housing Estate unit in Ilorin Metropolis.

Hence, this project could be achieved in area of documentation with the use of computerised approach for proper documentation in the maintenance of Housing Estate.

Finally, the standard of housing maintenance is likely to improve drastically if the computerised approach is applied.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND TO STUDY

One of the most important needs of man is shelter, this is due to the fact that man needs it for protection from environmental factors or natural forces, storage security e.t.c. The need for shelter has grown to an indispensable position.

However, the genesis of housing problem has been identified as having physical political, economic as well as social cultural implications. In Nigeria very little effort have been geared towards the comprehensive studied of housing problem.

A close examination of the present computer usage in many developing countries reveals however a considerable uncertainty as a real achievement and benefits. Different phenomena that have an impact on computer usage and utilisation in the developing countries have observed. Firstly the discrepancy between today's computer architecture designed for fast record keeping facilities in many developed countries. Secondly computer program for most application are based on developed in accordance with models that originate from a western views of problems and solutions which are of synonymous with practices and information needs of the developing countries in view of his second phenomena.

Meanwhile, government has made several efforts towards the provision of housing, some of which include; low cost housing at affordable price, self help build program through staff loan housing scheme, loan mortgage scheme housing corporations.

A survey of Estate Housing in Ilorin, the capital town of Kwara State shows that there is general lack of adequate maintenance of dwelling places. Generally, the exhibit lack of adequate maintenance in terms of servicing rectification and replacement, servicing is essentially the learning operation undertaken at regular interval of vary frequency. Unsuitability of component, damage of members in transits or installation and incorrect

assembly required rectification operation. Replacement becomes necessary when there is loss of materials and their desired qualities.

Thus, the state of buildings in most of the town is deplorable. In fact complete lack of interest in maintenance is evident from flaking paint in walls of most buildings, leaking roofs and blockages of drainage system etc. It should be noted that one of the major forces that catalyze the growth of economic, social and technology advancement of any nation is the development of maintenance culture. This has meaning, especially more in a developing economy, for the need to maintain the structures erected would help in the development of components locally unless we find ways and means of accelerating the development of maintenance consciousness, our desired goal of self reliance would remain an illusion, a mere mirage.

The use of buildings and the standards of safety and amenity by the public have changed rapidly during the 20th century. The existing building stock needs to be adapted to these changes if it is to be preserved substantially intact. Unless a majority of buildings are preserved the character of our towns and cities will be radically altered. As there are no laboratories in place for the development of an effective method of scanning the condition of buildings with a view to assessing their performances in order to control and minimize the cost of repairs, maintenance and replacements, currently increasing at an alarming rate.

Since these buildings are valuable assets for individuals, groups, government and companies. These assets represented by the buildings have over the years and when they have been preserved, increased in value. This preservation of buildings constitutes the maintenance programme, which shall be examined in this project and during recent years, this aspect has grown in importance and is now considered to be as important as construction.

1.2 NEED FOR THE STUDY

This study was inspired in the light of the prevailing predicament befalling in public buildings. Such predicament includes: The accelerate rate of wear and tear of building fabric inefficient and poor maintenance culture depicted by the management authority (i.e. federal ministry of Works and Housing). These called for definition of housing need which have been divided into its two most critical aspect; the requirements of new households and existing housing area requiring upgrading.

In the context of basic approach to maintenance strategy, where the key is the maximization of available resources, the existing housing stock, however poor most essentially be regarded as an asset to be conserved and improved not to be destroyed.

In an ailing economy such as prevalent now, the tendency should be to preserve products so that they could complete their live cycle. Maintenance as one may say, is related to background of a project, but a close look at nearly all the country's development plans and improved recurrent and capital estimates revealed that thoughts have been given to maintenance work. It was only during the fourth National Development Plan (1981 – 85, 35) that the nation addressed its mind to consultation and maintenance of existing facilities.

Yet no concrete success was recorded in physical terms. Hence, the decay and deterioration of public property in Nigeria due to lack of maintenance culture reach such an alarming situation that the Federal Government called for the intervention of Petroleum Special Trust Fund which is currently spending billions of Naira to bring back to life, a good percentage of ailing public property.

1.3 AIMS AND OBJECTIVES

The aim of this study on maintenance of public buildings; A case study of Low Cost Housing Oloje Ilorinis to appraise the effect of maintenance on public building, with a view to

evaluate their performance and making recommendations that can be done to sustain the economic life span and value of all used and non-used buildings within the estate.

To achieve the aim of this dissertation the following objectives were conceived.

1. To identified the type of structures in the estate.
2. To investigate the present state of the structures in the estate;
3. To study the modality for maintenance of the structures within the estate;
4. To find if any, those problems hindering the effective maintenance of the estate;
5. Finally, to make recommendations towards good maintenance of the properties within the estate.

1.4 STUDY AREA

LOCATION:

Ilorin the Kwara state capital lies at latitude 9°37" North and Longitude 6°33" East on geological base of undifferentiated basement complex of more or less continuous steep outcrop of granite occurs, limiting physical development in that direction. Ilorin has a land area of 188.0 hectares for various land uses. But the dominant land use in Ilorin is residential, followed by institutional land use because of its administrative nature and few industrial areas.

1.5 SCOPE OF STUDY

There are many housing estates or public buildings scattered all over Ilorin, but for the purpose of this research, Oloje low cost Housing Estate is used as a case study. And emphasis was on post-construction stages, which cover non-allocation, non-use, imprecision of utility for its sustenance and neglect without consideration for its maintenance.

CHAPTER TWO

2.00 LITERATURE REVIEW

2.10 CONCEPT OF BUILDING MAINTENANCE

Maintenance is a wide concept, and according to Leach (1961, 387 – 388)” it includes all such works as are necessary to keep the building in a condition in which it may be used in a normal way without risk to injury, whether to itself or its surrounding or to the life limb or health of persons “ it should be noted that most of the maintenance responsibilities are performed during the course of maintenance.

However, according to Reginal lee (1981) “ maintenance includes all works as are necessary to keep a building in a condition in which it may be used in which it may be used in a normal way without risk to injury, whether to itself or its surroundings or to the life, units or health of persons.

2.2.0 DEFINITION OF BUILDING MAINTENANCE

The committee on maintenance and protection of public property set by the federal military government of Nigeria. (1976) Defined maintenance as “ all works undertaken to keep restore a property to a state of preservation and acceptable standstard for its present and intended use”.

It is this sense that white (1973, 3) sees maintenance” as work undertaken to keep or restore every facility to an acceptance standard at an acceptance cost”.

The RKS / ISVA working committee defined maintenance as work undertaken in order to keep, restore or improve every facilities, that is, every part of a building it services and surroundings, to an accepted standard and to sustain the utility and the value of the facility. This definition includes improvement as an aspect of maintenance and this may

explain while miles, C.W.N (1972, 119) agrees that “ it is difficult to decide where maintenance ends and improvement begins”.

Professionally, maintenance is a continuous process of balancing service and cost in an attempt to please the tenancy, and preserve the physical condition of the property. While holding a ceiling on operating expenses and improving owners margin of profit, and far beyond the profit of financial profitability to correct the use and the economic and social life of the building in terms or alternative uses of the building or its site.

For the purpose of this study, the important aim of maintenance is to preserve a building so that it can be effectively serve its purpose of providing shelter. Thus maintenance,

- (a) present and aesthetic, attractiveness
- (b) place the building in a condition that enable it to fulfil its function.
- (c) Retains the value of the investment.

2.2.1 PURPOSE OF MAINTENANCE

The aim of maintenance includes promoting the durability of a building for efficiency, health, beauty, comfort etc, retaining the value of the investment and presenting a good appearance to the public. Stone P.A” (1983).

It should be noted also that one of the prime purposes of maintenance is to ensure that the use to which a building is the most suitable having regard to its physical character, legal status, economic returns and general environmental factors.

2.2.2 TYPES OF MAINTENANCE

It is necessary at this point to examine the basic components of maintenance and its system. Accordingly, Miles D. (1976,2) defines the function of maintenance to consists of three main components namely;

- i. Clearing and servicing;

ii. Rectification and repairs;

iii. Replacement;

Also, the system of maintenance can be grouped under planned and unplanned. Planned maintenance entails a lot of planning and organization and could be further sub-divided into planned preventive maintenance and corrective maintenance.

The different systems of maintenance stated by Reginal Lee, (1981) are as defined by BS 3811 and they include the following.

1. Planned maintenance;
2. Preventive maintenance;
3. Property maintenance by request;

2.3.0 PLANNED MAINTENANCE

This takes the form of routine or schedule maintenance repair and schedule must fall within an established budget. The budget must take into consideration realistic maintenance cost per the efficient operation of the property. The maintenance expenditure can be estimated. For instance, the type and cost of value should be determined and the materials can then be bought in advance and stored. BS 3811 (1964).

If plan is drawn up for the building, planned maintenance determines the work to be carried out and the cost of carrying it out.

Maintenance entails regular routine inspections and actions to avoid serious disruption in the useful life of a building. The system facilitates scheduling, planning and proper job execution. It is economic since it usually prevents complete failure of some elements or components. It may be necessary to visit the properties regularly and for a competent staff to make records of the nature of defects of salient parts as enumerated in BS 3811 (1964) are;

- i. External works;
- ii. Foundation

- iii. Walls;
- iv. Floors
- v. Doors;
- vi. Windows;
- vii. Plumbing;
- viii. Drainage;
- ix. Electrical Services;
- x. Roof etc.

Inspection will normally be followed with details schedule of items needed and the cost after which the workmen required are detailed to commence work. The goal of preventive maintenance is to keep every piece of operating equipment in efficient running order and to detect potential equipment failure before it becomes a problem. A good maintenance program should be composed of a series of inspection followed by appropriate corrective maintenance work. This can be efficiently accomplished using a checklist of activities to be performed on a regular basis daily, weekly, monthly, annually etc.

2.3.1 PROPERTY MAINTENANCE BY REQUEST

This involves the participation of tenant or occupier going to the maintenance section of the establishment to state in the requisition form, his house number, type of fault to be repaired and this form filled is given to the maintenance officer for approval and the implementation is carried out usually by medium skilled artisans, the nature exist in the form; as observed by Adebowale A. O. 1998.

- (a) Corrective or breakdown maintenance: This is when a malfunction or cessation of a function is noted and reported for repair works. Corrective maintenance is the work carried out when failure has taken place. Corrective may be defective for the following reason;

- (i) Tenants' attitude to repairs vary some may report promptly while others may show a nonchalant attitude until the property depreciates to a dangerous state.
 - (ii) In-coming work is irregular. Job can be planned and scheduled.
 - (iii) Non-productive travelling time is high especially if some of the tenants do not give adequate report to repairs. The Technical staff might have to make several trips before necessary repairs can be effected.
- (b) Unplanned maintenance: This is work necessitated by unforeseen breakdown or damage due to external factors such as rain, wind and other natural tendencies.

2.4.0 ASPECT OF PROPERTY MAINTENANCE

The issue of maintenance starts from the beginning of the project which include; planning, design and construction to the management stage to combat all sort of obsolesce such as physical obsolesce, economic and functional obsolesce. Therefore, the need for property maintenance can arise from the following steps according to Miles D. (1976,2) such as;

2.4.1 SERVICING

Planned on a regular cycle day to day maintenance. Most of which activities involving clearing and sweeping of ground (floor) daily, cleaning of internal and external element such as windows, doors, wall brackets and other monumental decorative elements weekly, repainting the part or that of the entire structure for protection and aesthetic purpose once in every four years and so on.

2.4.2 RENOVATION

This aspect of maintenance constitute the interface with improvement and refurbishment with improvement in the conversion of internal spaces of a building from one

shape to another to suit another change of use may be from residential use to commercial uses reflecting office spaces.

2.4.3 RECTIFICATION

This is an urgent response to inherent defects in the design, stages of construction process or installation stages of the building process. This encourages an opportunities to “reduce current capital expenditure against future maintenance cost”. A good maintenance practice will lead to effective management and specification during the project which may focus inherent implication for the liability of those involved in the work.

2.4.4 REPLACEMENT

There is no hiding the fact that both building systems and materials are subject to attack from variety of sources such as, the user, environmental phenomenon such as rain, severe wind blow and tremor etc; physical, biological and chemical agents. Base on these, the most appropriate solution is to keep the building in both economic viability and long physical functionality is to change or replace entire element that is faulty or undesirable.

2.4.5 RATIONALE FOR MAITENANCE

Inwanyanwu (1987), in his seminal paper, lauded property management and maintenance culture in Nigeria, identified four different rationale for maintenance.

- (a) To raise the quality of life existing facilities which have fallen bellow existing taste and demand e.g. conversion of a pit toilet to water closet.
- (b) To maintain an acceptable quality standard, particularly to existing structure fabrics and facilities which meet current taste and demand.
- (c) To attract higher rental income or value. The basic attribute of a rational human being is the quest for profit or benefit maximization and cost or discomfort minimization. In property development, values of structures vary directly with the

state of repairs. It is therefore, becomes necessary to enhance value or at worst keep it at par by regular maintenance.

- (d) To prolong the life span of building particularly at a time when the cost of new project are escalating due to inflation and in face of shortage of funds for construction. Also to upgrade as in renewals particularly where existing facilities have deteriorated beyond what normal repair and maintenance can rectify.

2.50 FACILITIES TO BE MAINTAINED

In any building, there are some items in it that require care in their maintenance.

These items, according to K.A. Wahab (1980), are:

- (a) The physical structure: This includes the finishes, which should remain stable at all times.
- (b) The mechanical services: These include the lighting system, cooling systems and lifts.
- (c) Components and features: Adequate cleanliness and good decorative state are essential for buildings.
- (d) Level of repairs: These are needed to maintain an adequate level of the fabrics including minor works in the form of alteration improvements and conversions.

2.60 MAINTENANCE OPERATIONS

In order to combat progressive deterioration in any building, Reginal Lee (1981) has observed the work necessary to the following forms;

- (a) Patching: This involves the more or less regular replacement of small parts or areas.
- (b) Replacement: This is of whole elements of components due to the fact that they:
 - (i) Are functionally unacceptable.

- (ii) Incurred high maintenance or running cost.
- (iii) Are aesthetically unacceptable.
- (c) Presentation: This is of protective coating, which could be for the purpose of extending the life of the protected material or maintain appearance.
- (d) Clearing: Though this is often regarded as a separate activity, clearing had important maintenance implications in curbing deterioration and preserving appearance.

2.70 **FACTORS RESPONSIBLE FOR MAINTENANCE**

Quite a number of factors affect the quality of materials in a building and hence call for maintenance. Mosaku T. (1990) submitted that the following factors affect a building, hence its maintenance.

- (a) Design consideration.
- (b) Materials.
- (c) Economic consideration.
- (d) Natural factors.
- (e) Construction standard and Site practice.
- (f) Building occupancy.

(a) Design consideration: Inherent design problems, according to Dadu D.W. (1994) “all standards are geared primarily towards the good health and safety of the occupants, every maintenance or work are executed to restore a building, its services and equipment through a major overhaul to meet its original concept, design and may include any additional extensions of the building”.

Moshaku (opcit) pointed out that almost every other factors affecting the level of maintenance requirement and cost of repairs is influenced by design consideration. He further went on to say that there is often a serious conflict between design norms,

designers own biases and environmental factors, behavior of material and components and the client and user requirements, however, correct judgement and better understanding can provide rational and balanced compromise, cost of maintenance will be high where design decisions are based on personal biases rather than on compromise between the various areas of conflicts.

Design specification and location of some fittings can be such that will make accessibility to them difficult when maintenance is required, resulting in extra man-hours, hence high cost and may also lead to other parts when access is to be made. This will lead to subsidiary operation even though the life expectancy of such parts may become doubtful.

In conclusion, functional approaches should be adopted in respect of standardisation of policy decision and their relationship to future maintenance expenditure covering maintenance, major repairs and partial or total replacement of parts and components should be facilitated.

- (b) Materials: Generally, two major causes of failures in materials and components are natural causes of failure and wrong application of materials. This can lead to malfunction due to some factors such as usage, manufacturers mistake, poor specification, the state of materials before use and bad workmanship. At times there is insufficient instruction on material usage. Example, the incorrect preparation of paint and wrong fixing of doors. Failure would always occurred in the case of electrical fittings as a result of fluctuation in voltage, over heating of switches and sockets.
- (c) Economic consideration: According to Hill J. (1969), the initial choice of materials, components and form of construction is usually influenced as regards the economy. Sound maintenance practice. This techniques such as cost-in-use introduces new criteria for the exercise of judgement which may permit thrift economy. Stone P.A. (1983) opined

that sometimes too there is a tendency to confuse what we need rather than the best of what we want. Hence, durable and low maintenance material may be specified, but users may not need it for other reasons. Decision to use such materials will be based not only on maintenance requirements or durability, but also on whether it is able to stand the best of time which it was needed.

- (d) Natural factors: The condition of a place in a natural environment where the building is built has greater influence on the materials and component of building. Extreme weather condition may render materials and components defective such as planking of paint, loss of adhesions of wall files, cracks at floor joints, continuous dripping of rain water around edges, groups and joints will further the growth of mushroom and algae. This weakens the fabrics of the building as it affects the rate of moisture absorption.

Pattern straining in wall surfaces resulting from concrete flat roofs will cause damage to external wall surfaces and may increase the heat absorption rate of the surface.

- (e) Construction and standard site practice: Since building process is ruled by time factor rather than anything else. The clause in the conditions of contract of a defect liability period where the contractor is held liable for any defect that may arise after handling over a completed project is a recognition of the fact that there might have been shoddy jobs. (Moshaku (ibid.)). Most usually affected are roofs and ceiling finishes, built-in furniture, plumbing items, etc. a break down of these parts will necessitate extra maintenance costs as a result of poor workmanship detected after the defect liability period. The absence of patience, skill and adequate supervision will result in considerable maintenance cost in addition to the fact that the completed building does not represent value for initial capital outlay.

- (f) Building occupancy: Boyden J.(1964) opined that social habits may influence the frequent and thorough maintenance works are executed or how careful we handle a component or facility.

2.80 **COST OF MAINTENANCE**

Leer R. (1978) stated that “ maintenance of building entails work undertaken in order to maintain, improve or restore the condition of the building or its facilities into a fair state or condition fit to serve the purpose for which it was built”. This according to Lee includes works carried out to continuously, keep the building, its services and the surrounding up to expectable standards and value. Hence, maintenance cost is the cost for maintenance work. Seeley I.H. (1974) stated that some of the principal functions of maintenance are: - to ensure safety of occupants, visitors and the general public, to maintain services and such as heating, lighting, escalators and fire alarm system to maintain decorative surface and carryout adequate cleaning; and to prevent or diminish significantly deterioration of the fabric.

These cost are very difficult to account for more often than not, records are not taken to show the various payments made. In fact, various payments are made from different ways. Stone (opcit) states that every building project involves stream of payment over a long period of time usually the life of the building, and the payments of three main types.

- A. Payment for site, construction costs and fees.
- B. Periodic payments such as full internal and external redecoration, replacement of engineering fittings and fixtures. The period could be every 5years or 10-15years.
- C. Annual payment relating to minor repairs, cleaning, heating and lighting.

2.81 CALCULATING MAINTENANCE COSTS

In calculating maintenance costs, Seeley I.H (Ibid.) argued that there are two basic approaches, viz.

1. To discount all future cost at an appropriate rate of interest, and also to convert all payments of present value (PV) or present worth.
2. Express all cost in the form of annual equivalents taking into account the interest rate and annual sinking fund. In this method there is a require sinking fund to replace the capital when the life of the building has expired, and hence the owner is entitled to interest on his capital, it should be noted that this over simplified as for no account of the cost of demolishing the oil roof or any temperature work that may be needed to protect the occupant and the content of the building during reconstruction. {I Seeley Ibid}.

2.90 DIFFICULTIES IN ASSESSING MAINTENANCE COSTS

Due to variety of payments made in respect to cost of maintenance and at different times and also due to the complexity of the work involved, it is not always easy to account for all these payments.

James D. (1969) listed out the following difficulties in assessing the cost of building maintenance: -

- a. It is difficult to assess the probable maintenance cost of different materials, processes and systems. There is a great scarcity of reliability maintenance cost data, tabulated in a meaningful way. It is not easy to predict the lives of materials and components in a variety of situations. Even the lives of commonly used materials like paints, show surprising variations and are influenced by a whole range of factors, including: types paint, number of coats, condition of base, extent of preparation, method of application, degree of exposure and atmospheric condition.

- b. Difficulties in assess payment. Seeley I.H.(Ibid.) states that there are three types of payments involve; Initial, annual and periodic. All these have to be related to a common basic for comparison, this requires methods of discount cash flow, which may not show a true picture of the cost in some cases.
- c. Difficult in the selection of suitable long-term interest rates. In an advent of inflation, interest rates are always irregular and vary. Inconsistent at times may rise dramatically high. This makes it difficult to compute cost effectively.
- d. Inflation trends may not affect all cost in a uniform manner, it can distort the cost of certain materials while white others may not even be affected. This distortion significantly affects the calculation of maintenance cost.
- e. Where project are built for sale or investment, client may show little in making saving in running cost if these increase the initial cost.

2.10.0 FACTORS AFFECTING MAINTENANCE COST

Maintenance work is very labour intensive and the work dispersed and uncoordinated. These are due to several factors that accounted for low or high maintenance cost.

Naturally factors which account for high cost of repairs, replacement, clearing etc include natural disaster like flood storm fog etc. All these have a great effect on the amount of maintenance work. Drak. B. (1969), has drawn attention to a number of fundamental problems of building science that are still largely unresolved, such as reliable accelerated weathering, the mechanism of frost action in porous substances and the means by which dirt where to surface.

Stop P. states that a reduction in initial construction cost often leads to higher maintenance and running cost. The level of damage due to the components will determine the level or volume of maintenance work, hence the cost thereof. If elements are allowed to be in a dilapidated state for a long time, this again will increase the cost of repairs.

Over-usage of buildings and related facilities would lead to high maintenance costs. Seeley I.H. states that user cost are synonymous with future costs and comprises both running costs and occupational charges. This includes charged for heating, lighting plumbing-work etc. all these factors affect maintenance cost.

2.11.0 BENEFITS OF MAINTENANCE COST

Maintenance will help to improve the value of a building, especially in the cost of renewals. This is particularly necessary where existing facilities have deteriorated beyond normal repairs.

Naughty H. (1972) maintained that dilapidated and unhealthy buildings in a decaying environment depresses the quality of life and contribute in some measure to anti-social behaviour. Maintenance by arresting decay of facilities extend the physical life of a building and thereby delays replacement and defers expenditure on a new construction.

H.M.S.O (1972) reviewed that in 1969, the estimated annual expenditure of building maintenance in Great Britain was 28 % of the total construction output for that year. While 40% of labour force of the construction industry was used in the maintenance.

H.M.S.O. (Ibid.) went further that building maintenance was of great significance to the economy not only for the scale expenditure involved, but also because it was important to ensure that the nations stock of building, both as a factor of production and accommodation, was used as effective as possible.

Firmness, utilities and aesthetics are the Beauty State of an object. "Appearance according to people is seen latter from character". Therefore, the condition and quality of a building in an area reflects the public or private pride or indifference. The level of prosperity in the area or the social value.

2.12.0 MAINTENANCE AND ECONOMIC DEVELOPMENT

Since the final products of the building industry are at a fixed location and highly durable, then a greater output of the industry should be devoted to maintenance so as to keep the existing buildings in a useable state. Maintenance sector of the building industry usually involves large sums of money and large number of employees. According to Miles, D. (1976, 5), "that is partly due to the nature of maintenance work, which involves a large number of small jobs some of which take as little as an hour or so of a craftsman's time". It should be noted that the product of the building industry are vital to the functioning of the economy, and maintenance sector is the key to economic development because of its size of output, number of people employed, its contribution to the gross national product (G.N.P) and its contribution to the national stock of investment goods.

It is clear that the total supply of buildings is very inelastic even in the long run and the only way to increase the stock of building at a particular period is through repairs and maintenance for instance, in Britain a "sum of \$164 million pounds was devoted to repairs and maintenance out of the total output of \$5505 million pounds in 1974, given a total output size of 30%.

2.13.0 PUBLIC BUILDINGS / ESTATES

Public buildings is provided mainly by local authorities but there is also public support for housing associations within a context set by Federal Government, Local Housing Authority is responsible for deciding the quality and location of their estates.

According to Thorncroft, M (et al), public estate is the estate of the various public bodies in Britain constitute the largest single ownership of landed property, they vary in size, character, public control, accountability and management. It represents a very large number

of separate units, some of which may have much more in common with private estate than with one another.

He stressed that as far as of estate is concerned, the basic features that distinguish the different public buildings are the major policy objective of the function to which they are committed. These constitute, directly to the aim of the estate.

Local authority capital expenditure on housing is vetted by the Federal government in this country through Federal Housing Authority loan schemes. Federal Government is concerned not only with the quality and quantity of the stock of local authority Housing but also with the contribution local authority expenditure makes to the public expenditure and to public borrowing.

Federal Housing Authority issues advice on the size and quality of individual dwellings and prices; these used to be mandatory but now only indicative costs are provided. Stone P. opined that "prices criteria are generally limited to initial costs with little or no consideration of maintenance and running costs".

It is difficult to control quality and cost by regulating quality and cost depending on the design criteria.

2.31.1 THE NEEDS FOR PUBLIC BUILDINGS.

Housing need depends on the formation of households by structure and number. Demands depends on need and the ability to meet housing cost, often the scale and distribution of households does not match the distribution of dwellings. Even if the number is adequate, the dwelling may not be in the locations in which they are required, on of the right size and quality. The greater their incomes, the more households generally will be prepared to pay for their housing and the less they will be prepared to compromise on size, quality and location. Their demands will be reflected in the rents and purchase prices they are prepared to offer. In the public sector greater national affluence usually results in political pressure for

better housing. When the economy is buoyant, income tend to increased and migration at its highest, tending to push up the demand for dwellings.

House purchase is generally financed on borrowed money. The amount which can be borrowed depends on the size and stability of the borrows incomes and hence the ability to service the loan. In Nigeria mortgage finance is provided mainly by building societies and to a smaller extent by banks and insurance institutions.

The demand for dwellings including new dwellings depends on the availability of mortgage finance and ability of purchasers to service mortgage.

2.13.2 MAINTENANCE OF PUBLIC BUILDING

A substantial part of the built infrastructure is developed and maintained by the public sector but there is considerable doubt as to how efficiently and effectively this is provided and managed. As long as there is common finding for a whole service the maintenance of building and infrastructure are at risk of being squeezed, since maintenance is so easy to postpone.

Clearing neither public nor private organizations have unlimited funds and there are occasions when funds are insufficient to finance all the new work and the maintenance work which is desirable. When finance is light it is generally easier to postpone maintenance and upgrading work than expenditure on other aspect of living. For these reasons the owner occupied dwelling of older and poorer households tends to be those most likely to fall into decay or to lack improvement now necessary to maintain the value of dwellings.

While the price of dwelling tends to rise with improvements, it tends to fall if maintenance is neglected and if no effort is made to up – date fixtures and fittings in line with changing fashions and expectations. Much maintenance and improvement work is within the scope of households especially now that processed materials, easily fitted components, together with improved tools and techniques have considerably reduced the skill content of much of the work. Given the incentive of rising costs and an increased capacity to tackle

maintenance work, it is not surprising that a great deal of maintenance and improvement work is now carried out by householders with considerable savings in costs.

Householders purchasing a dwelling do not always appreciate the scale of the cost of maintaining standards and find it difficult to finance such work.

Leases for dwellings do not usually require tenants to accept responsibility for maintenance and improvements, although some may require the tenants to carry out internal decoration and minor repairs. As a result rented dwelling in the private and public sector tend not to be improve to current standards and often are not adequately maintained; the greater the delay in maintenance, the greater the costs and the use of resources. May eventually become unfit for occupation and are condemned as slums.

The government has an incentive to encourage maintenance and to arrest the deterioration of the housing stock because in the long run it is advantageous to maintain a stock of dwellings for renting; grant and subsidies are sometime offered to rehabilitate and replace deterioraty stock.

2.13.3 MAINTENANCE, REHABILITATION AND REPLACEMENT

A substantial part of the built infrastructure is developed and maintained by the public sector but there is considerable doubt as to how efficiently and effectively this is provided and managed.

Inevitably settlements are in a constant state of charge. Buildings and infrastructure age and tent towards financial, functional and physical obsolescence and require increasing maintenance, adaptation and alteration, and eventually replacement. The rate of such obsolescence depends to a large extent on the prosperity of the firms and households who occupy the buildings and contribute to the revenue of public bodies.

2.13.4 MAINTENANCE AND DURABILITY

The durability of building components varies considerably with their nature. Paints last only a few year, while brick and stone unit often last a century or longer, it also depends on use and on the quality of maintenance, some materials such as glass and asbestos cement goods are brittle and easily damaged on impact, others such as reinforced concrete and stone are very strong. How long materials and components last depend on where they are and what forces they have to endure. Damages chemicals in the air rain and ground, impact and rough.

CHAPTER THREE

3.0 SYSTEM DESIGN AND ANALYSIS

Research methodology forms the main stay of the research process. According to Mc Clareta (1988), research methodology is the basic plan, which guides the data collection and analysis phase of the research project. It is the framework, which specifies the resources of data.

In carrying out this research on computer approach to the maintenance of Federal Low Cost Housing Estate, Oloje Ilorin Kwara State” the following principles can be followed as a guide of the research;

1. Development and administration of research instrument.
2. Data analysis and interpretation.

3.1 RESEARCH INSTRUMENTS

The aim of this thesis was to find out the extent to which maintenance of public building that is housing estate can be made effective using some randomly selected houses out of 250unit block of flat at Oloje low cost estate.

In order to achieve this goal we have to use the following instruments

- i Primary data : this include personal interviews, questionnaire administration and reconnaissance survey site inspection.
- ii Secondary data: this includes the use of text books, journals, thesis or past research work.

3.1.1 PRIMARY DATA

For the purpose of this study, the data was collected through the followings:

3.1.2 PERSONAL INTERVIEW

Interview schedule was used to obtain informations from controllers of works in charge of Oloje estate at Federal Ministry of Works and housing (FMWH), at federal secretariat and also the occupants of the flat.

The purpose of using interview was enable me to have an insight into other aspects of the study.

3.1.3 QUESTIONNAIRE

Questionnaires were designed and distributed to a randomly selected samples of the occupants, and Federal Ministry of Works Controller. The researcher used reconnaissance survey, which has to help in obtaining additional information. Reconnaissance survey focused on site layout, analysis of infrastructural services (i.e. Water, Electricity supply), the type of residential houses and physical conditions where identified to ascertain the nature of maintenance strategies for an effective management of the houses within the estate.

3.1.4 SECONDARY DATA

In reviewing the literature for this dissertation and intensive reading of different text, journals, seminar papers, newspapers, magazines and related projects e.t.c from organs that has contributed immensely to the provision, development and the maintenance of public buildings for low income and middle income. Seminar papers and journals were obtained from lecturers, students practicing architecture for the successful researches.

3.2 SAMPLING TECHNIQUE

Gomez (1983) defined sampling technique as a design which specifies the manner in which sampling unit are to be selected from the whole population. This sampling technique employed for this dissertation is random sampling in which the areas in estate were selected.

In order to determine the sampling population for this research work, Oloje Estate was grouped into zones/ lane viz. A to D out of which some houses were selected at random from each zone within the estate to ascertain their own level maintenance towards the estate and identify those in bad state of the repairs, those that require completion and various forms of maintenance works. A total of 54 questionnaires were administered out of which 47 was response received.

3.3 METHOD OF DATA ANALYSIS

The data collected from the questionnaires, physical site inspection and through literature reviews were gathered and analysed with the use of descriptive means. The methods such as tables, charts, and pictures were employed.

3.4 CHOICE OF PROGRAMMING LANGUAGE

The system (software) is developed with Microsoft foxpro environment. The choice of software is governed by pragmatic considerations. These are:

1. Compatibility.
2. Maintainability.
3. Readability.
4. User friendliness.
5. Portability.

(1) COMPATIBILITY.

The programme is written on an IBM compatible machine so that it can be executed on any IBM compatible personal computer.

(2) MAINTAINABILITY

With Microsoft foxpro debugging feature and ease in use, maintenance of the system become very easily.

(3) READABILITY

The choice of the software also aided in the coding of the system thereby allowing for proper programme documentation to ease debugging and maintenance of programmes.

(4) USERS FRIENDLINESS

The programme is ease to operate. Its user – friendly nature allows novices to be able to operate without prior knowledge of computing. It menu-driven capabilities made this easy.

(5) PORTABILITY

The program is not written for a single user environment alone. The choice of programming language has made it possible for it to run on a multi- user environment. This can be achieved if run on a multi-user operating system e.g. window NT.

3.5 **INPUT AND OUT SPECIFICATION**

3.5.1 **INPUT SPECIFICATION**

Each occupant is expected to fill the entry disk form, which are stored in general database file (i.e. MAINT. DBF). The formed of the proposed form is as shown below:

House Number-----
House type-----
Name of occupant-----
Date of entry-----
Payment-----
Balance-----
Terminal Date-----
Monthly Bill-----

3.5.2 DATABASE DESIGN

The proposed system will have one database file called MAINT. DBF with the following database structure:

S/No	Field	Type	Width	Dec	Remark
1	H type	Character	10	-	House type
2	H cost	Numeric	15	2	Cost of the house
3	H no	Character	10	-	House Numeric
4	Pay	Numeric	15	2	Payment
5	bal.	Numeric	15	2	Balance
6	Occ – name	Character	28	-	Name of occupant
7	Ent –date	Date	8	-	Date of entry
8	Ter- date	Date	8	-	Terminal Date
9	Mon-bill	Numeric	15	2	Monthly bill

3.5.3 OUTPUT SPECIFICATION

The proposed system is expected to generate the following reports:

- (1) List of all the occupants
- (2) List of owing occupants
- (3) Individual occupant

CHAPTER FOUR

4.0 IMPLEMENTATION AND DOCUMENTATION

4.1 IMPLEMENTATION

To use the program, the system must have the following hardware and software specifications

- (1) Windows 95 or higher running on Pentium processor
- (2) A hard disk with 100MB of available disk space for a normal installation.
- (3) A 3.5" floppy drive and windows '95 keyboard
- (4) At least 16MB of extended memory
- (5) A windows-compatible mouse and SVGA Monitor (with 4 M RAM)
- (6) Microsoft fox pro

4.2 INSTALLATION

To install the program from floppy drive:

- (a) Make a directory COAM in C drive (i.e. if your hard – disk is C)
- (b) Put the floppy (the program) in floppy drive
- (c) Type: copy A:\ COAM \ *.* C:\COAM at the Ms-Dos prompt.
- (d) Press enter key to begin copying files to the machine (i.e. hard-disk)
- (e) Load Microsoft foxpro from program menu.
- (f) At the command window (prompt), type Do C:\COAM. PRG and press enter key.

4.3 COST IMPLICATION

HARDWARE:

- Pentium 233 MHz (system unit)
 - Multimedia kit
 - CTX Monitor
 - Windows '95 keyboard
 - Mouse
 - Printer (LaserJet 6L) ----- ₦ 45,000
- } ₦ 80, 000

SOFTWARE

- program developed ----- ₦ 55,000
- User Manual ----- ₦ 5,000
- Training of 2 staff ----- ₦ 12,000

4.4 USER TRAINING

The programs develop needs to be acquainted with the user. This implies that the users of the program need to be trained to adequately justify the capital invested on the new system. This may take about two weeks with minimum of four hours per day.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

Policy concerning maintenance of building should not only be a black and white issues but should be an instrument for the economic substance of the building components as to serve their useful life span and edifice for which huge investment expanding could be seen as a moment for the income generation as a viable venture.

Therefore, the research would want most of his suggestion as regarding the Oloje Housing Estate a fulfil dream. So as to bring retained in an adorable fashion as the funds, which would be recouping could be geared towards the provision of similar programme by reducing maintenance cost and fulfilling the aim of owner occupier housing programme through proper maintenance system in Nigeria.

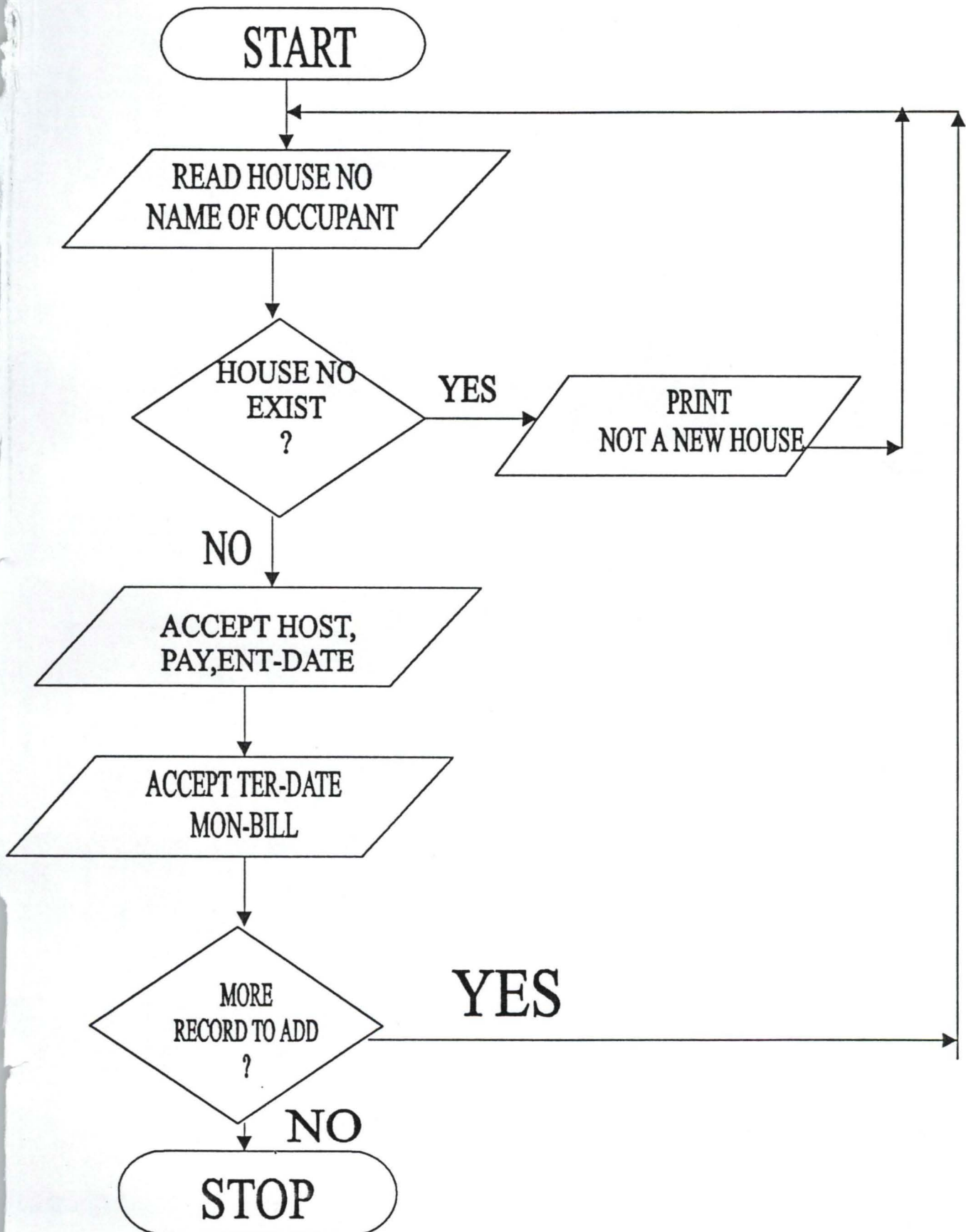
5.2 RECOMMENDATION

1. Site and services scheme should be well defined as to incorporate maintenance policy for any of its project after the completion.
2. All the professional in the (FMWH) should form a common front that will stem the federal government to establish a maintenance policy for the maintenance of all their estate across the state.
3. Any scheme or programme with such laudable objective should be completed as when scheduled to facilitate easy allocation of such, properties and a maintenance log books be kept by the occupier as to document the trends of maintenance work carried out on a particular building.
4. A property maintenance management Department should be created in the estate where a maintenance management surveyor will be employed to see to the effective

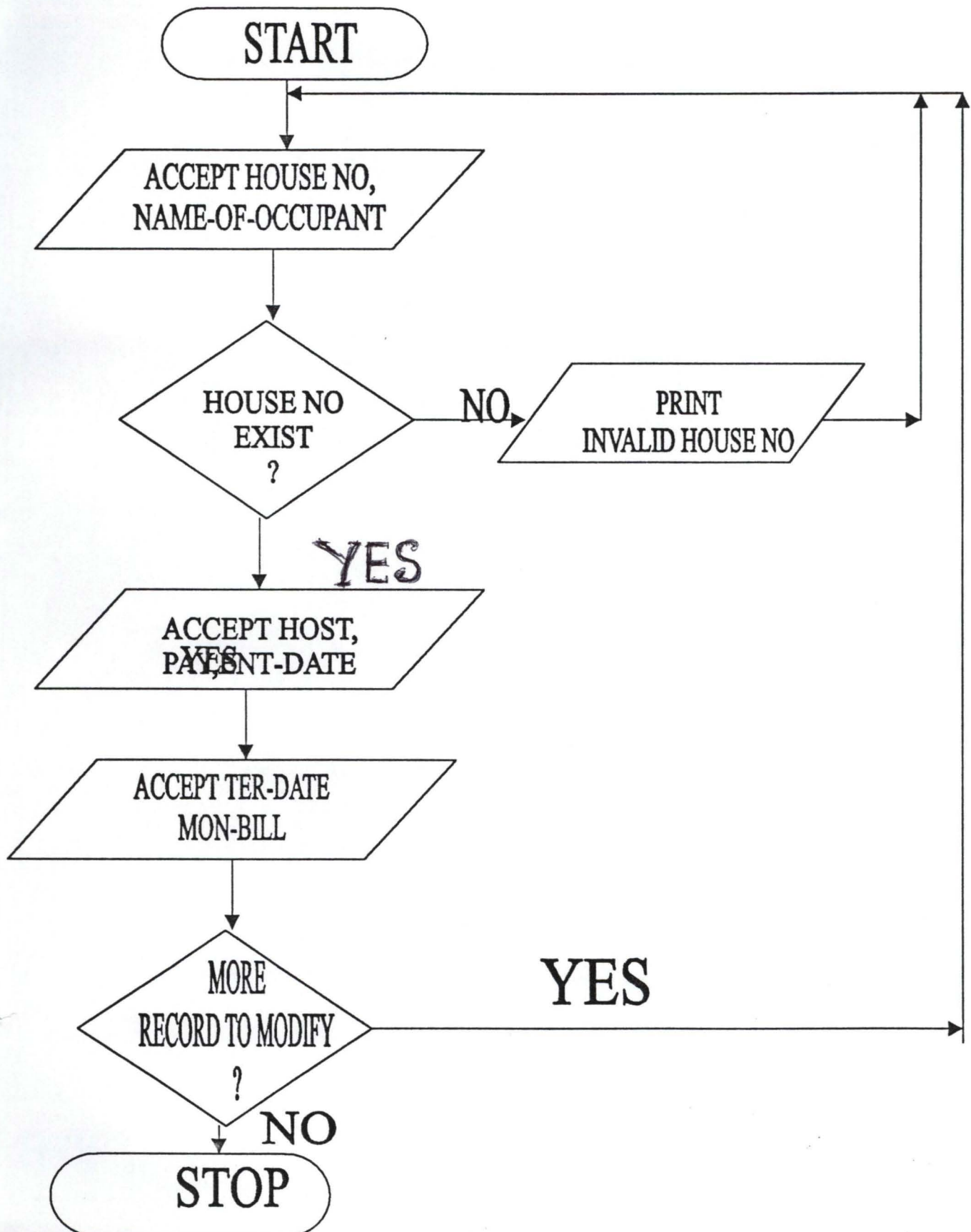
maintenance of the estate for future references as what led to the cause of defects and how it was remedy. And this will also facilitate frequent inspection of the build components and their performance.

5. A good drainage system should be provided to reduce the effect of dampness sagging and penetration of running water.
6. Bore -hole water could be drilled at the various area of the grouping from A to I where distribution will be facilitated.
7. The corrections to the identified defects in the cause of the research should be made to work for Oloje Estate and all other similar public buildings in the state.

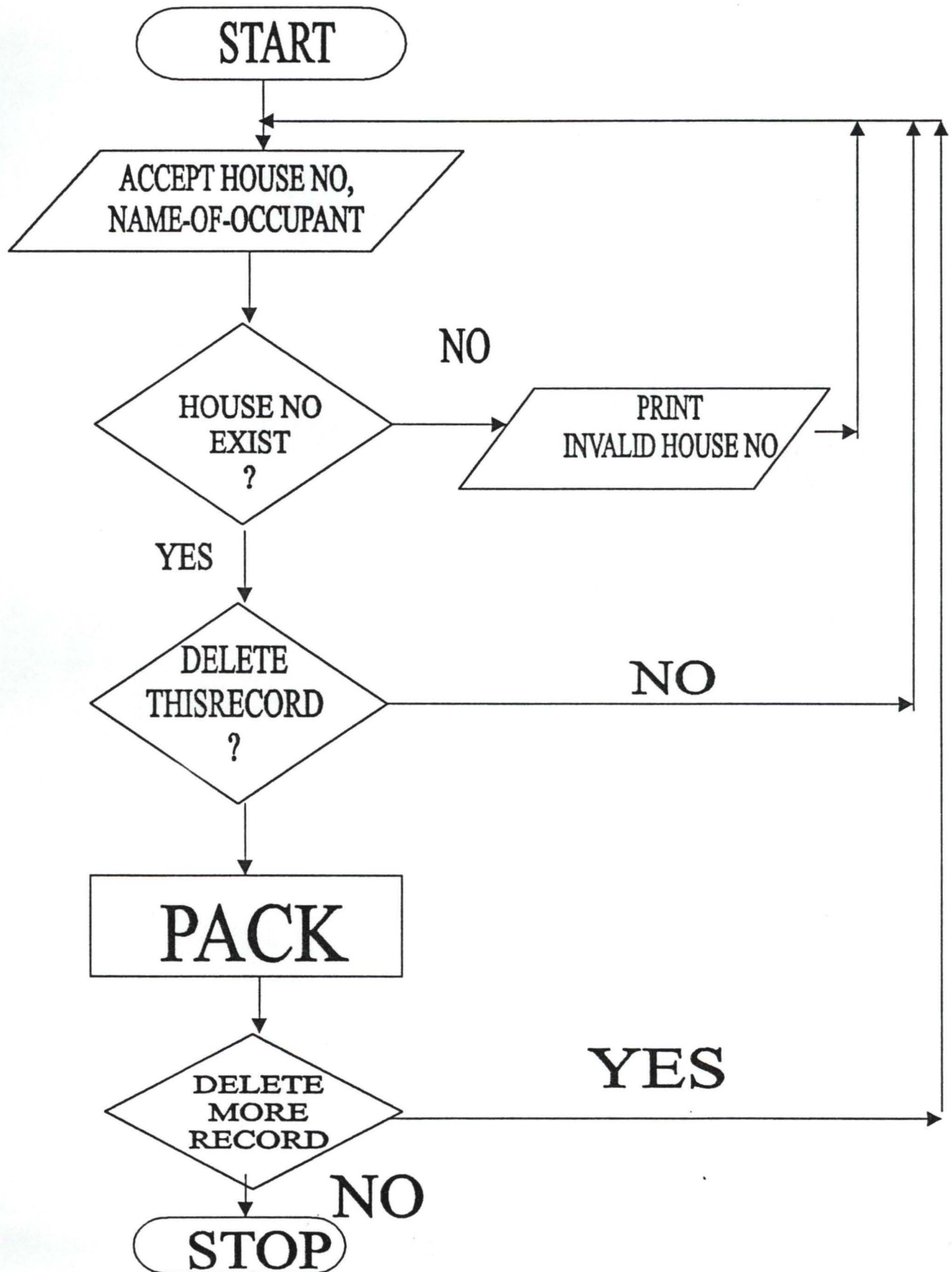
ADD RECORD



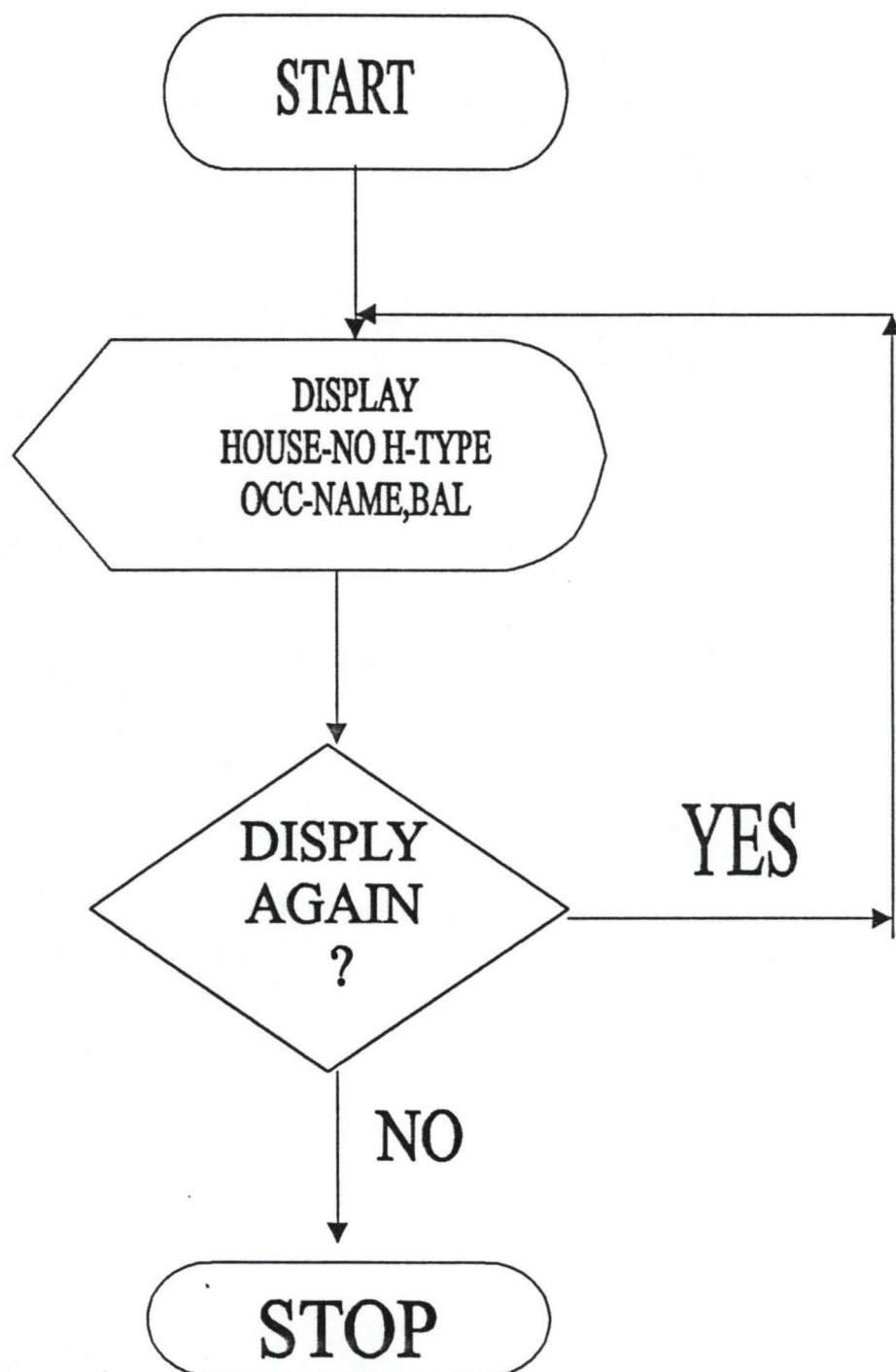
MODIFY RECORD



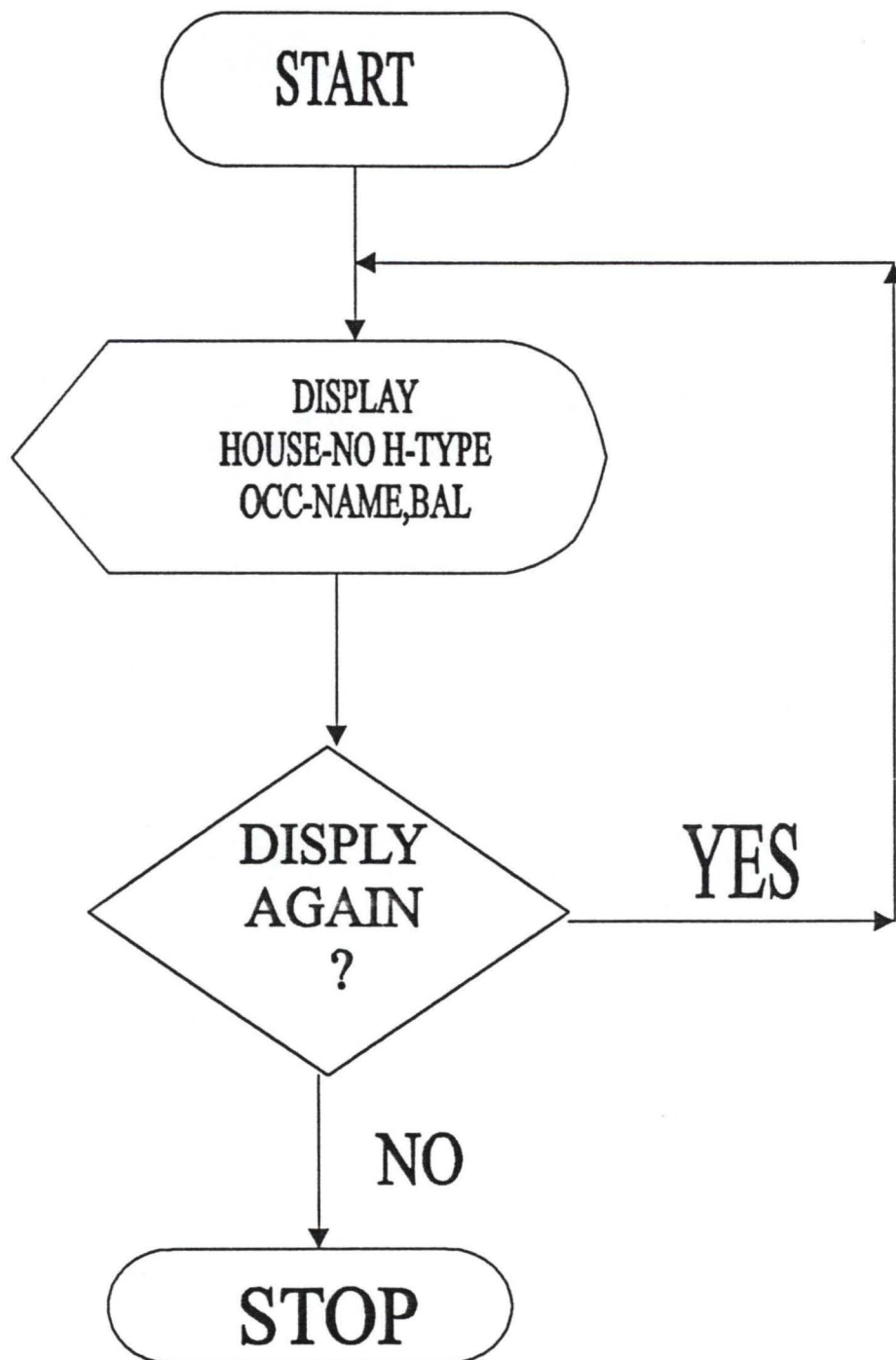
DELETE RECORD



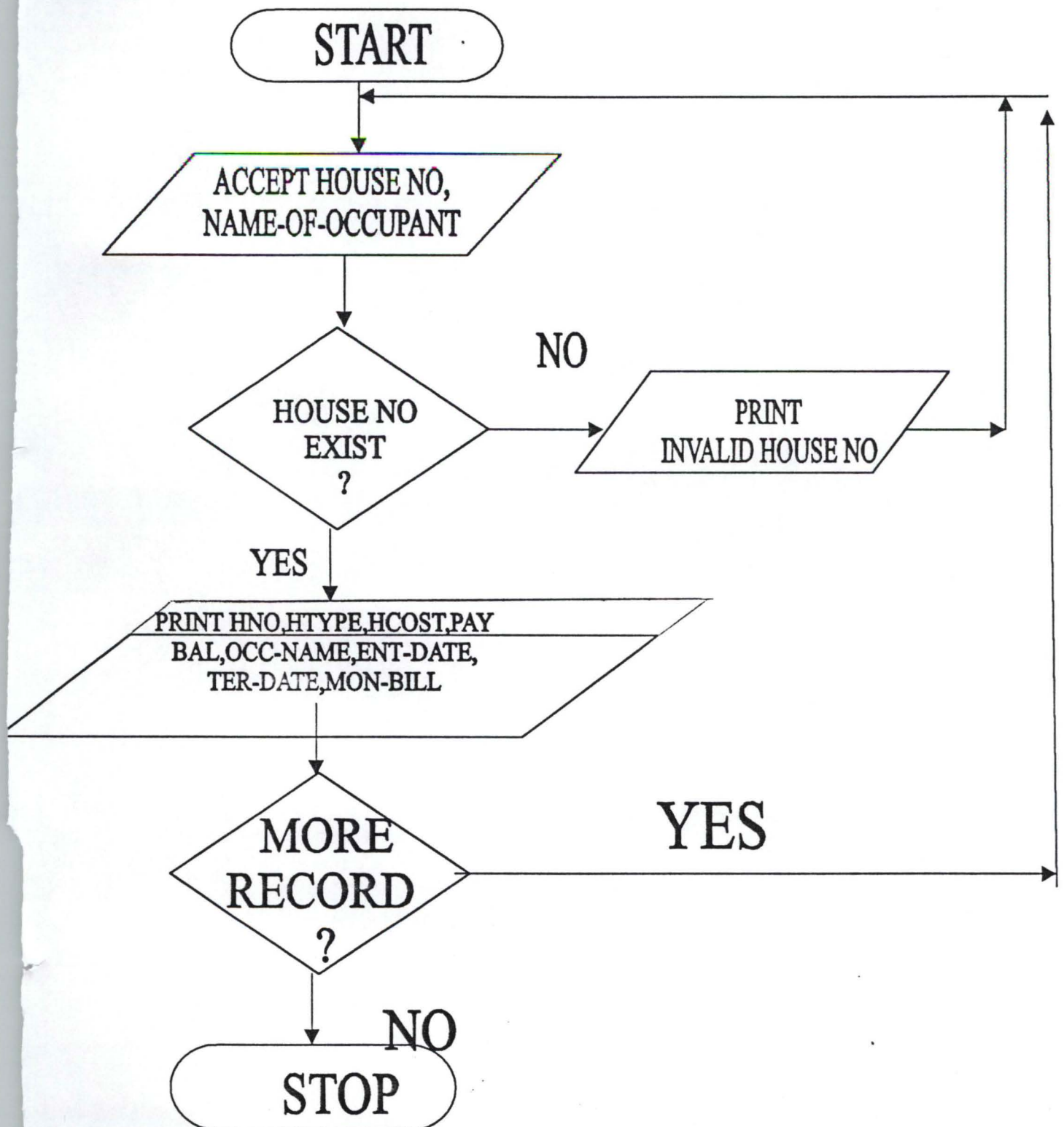
VIEW



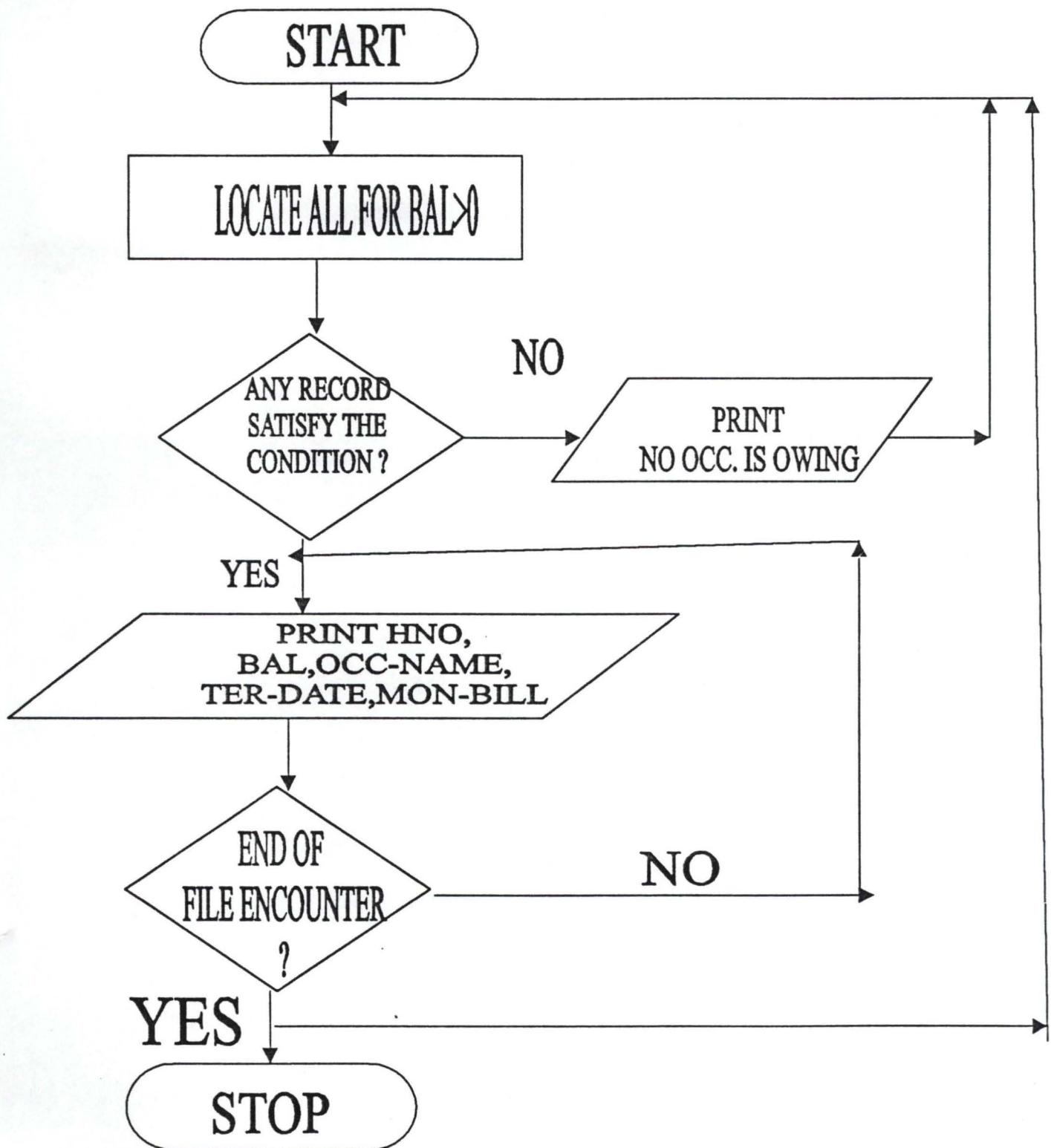
SUMMARY



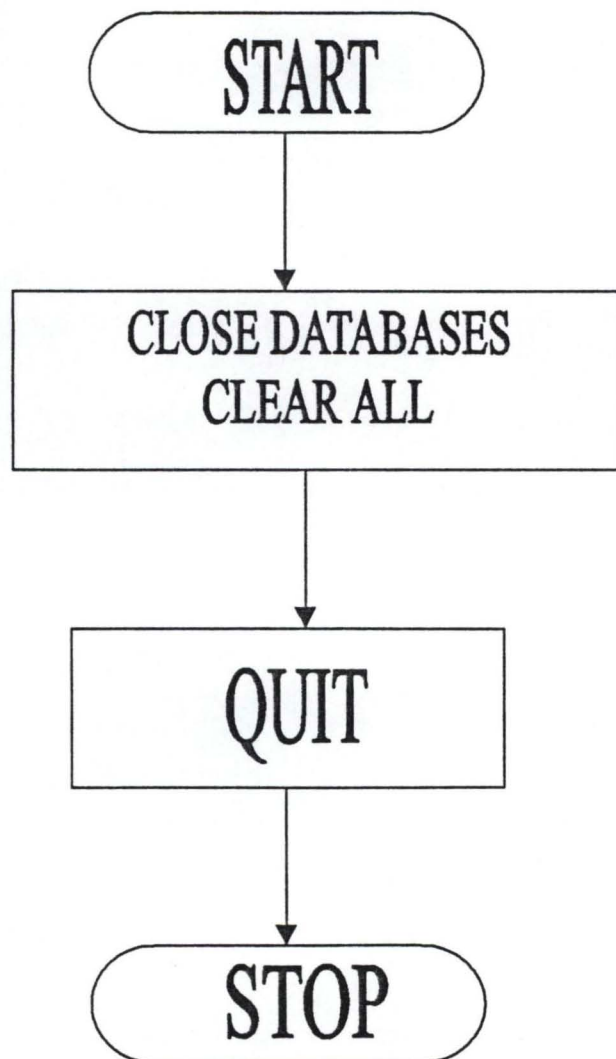
SPECIFIC OCCUPANT



OWING OCCUPANT



EXIT




```
CLOSE DATABASES
CLOSE ALL
CLEAR ALL
SET SYSMENU OFF
SET SYSMENU TO
SET PATH TO C:\coam
SET DATE TO BRIT
SET STATUS OFF
SET SCOREBOARD OFF
SET ESCAPE OFF
SET CLOCK OFF
SET SAFE OFF
SET TALK OFF
SET BELL OFF
SET EXACT OFF
SET PALETTE ON
```

```
DO dem
```

```
clear
```

```
DO WHILE .T.
```

```
    DEFINE WINDOW main FROM 0,0 TO 35,110 PANEL COLOR RB+/B+ TITLE
    'COMPUTERISED APPROACH TO THE MAINTENANCE OF HOUSING ESTATE 'FONT 'ROMAN', 16
    ;
```

```
        CLOSE FLOAT GROW ZOOM
```

```
    ACTIVATE WINDOW main
```

```
    DO barmenu
```

```
    DO newrec
```

```
    DO rep
```

```
    ACTIVATE MENU barmenu
```

```
ENDDO
```

```
PROCEDURE barmenu
```

```
    DEFINE MENU barmenu BAR AT LINE 8
```

```
    DEFINE MENU barmenu IN WINDOW main
```

```
    DEFINE PAD newpad OF barmenu PROMPT ' New Occupant ' COLOR SCHEME 3
```

```
    DEFINE PAD updpad OF barmenu PROMPT ' Update record ' COLOR SCHEME 3
```

```
    DEFINE PAD utipad OF barmenu PROMPT ' Utility ' COLOR SCHEME 3
```

```
    DEFINE PAD reppad OF barmenu PROMPT ' Report ' COLOR SCHEME 3
```

```
    ON PAD newpad OF barmenu ACTIVATE POPUP newrec
```

```
    ON PAD updpad OF barmenu DO updpad
```

```
ON PAD utipad OF barmenu DO uti
ON PAD reppad OF barmenu ACTIVATE POPUP rep
```

```
RETURN
```

```
PROCEDURE newrec
```

```
  DEFINE POPUP newrec MARGIN RELATIVE COLOR SCHEME 4
  DEFINE BAR 1 OF newrec PROMPT '\<New Occupant' MESSAGE ""
  DEFINE BAR 2 OF newrec PROMPT '\<Quit' MESSAGE ""
  ON SELECTION POPUP newrec DO filepro
```

```
RETURN
```

```
PROCEDURE rep
```

```
  DEFINE POPUP rep MARGIN RELATIVE COLOR SCHEME 4
  DEFINE BAR 1 OF rep PROMPT 'Occupants(All) ' MESSAGE ""
  DEFINE BAR 2 OF rep PROMPT 'Occupant(individual)' MESSAGE ""
  DEFINE BAR 3 OF rep PROMPT 'Owing occupants' MESSAGE ""
```

```
  ON SELECTION POPUP rep DO prepro
```

```
RETURN
```

```
PROCEDURE filepro
```

```
  HIDE POPUPS ALL
  HIDE MENUS ALL
  DO CASE
    CASE BAR()=1
      DO occnew
    CASE BAR()=2
      CLEAR
      QUIT
```

```
  ENDCASE
  CLEAR
  DEACTIVATE POPUP file
  SHOW MENUS ALL
```

```
RETURN
```

```
PROCEDURE PREPPRO
```

```
  DO CASE
    CASE BAR()=1
      DO OCALL
    CASE BAR()=2
      DO OCSPE
    CASE BAR()=3
      DO OWOC
```

```
ENDCASE
CLEAR
DEACTIVATE POPUPS REP
SHOW MENUS ALL
RETURN
```

```
PROCEDURE DEM
CLOSE ALL
CLEAR ALL
CLEAR
STORE 0 TO CONT
DEFINE WINDOW main SHADOW FROM 0,0 TO 35,115 TITLE ' COMPUTERISED APPROACH TO
THE MAINTENANCE OF HOUSING ESTATE ' FONT 'ROMAN', 11
ACTIVATE WINDOW main
@8,15 SAY 'COMPUTERISED APPROACH ' FONT 'ITALIC', 20 STYLE 'BT'
@11,35 SAY 'TO' FONT 'ITALIC',20 STYLE 'BT'
@13,10 SAY 'THE MAINTENANCE OF HOUSING ESTATE' FONT 'ITALIC',20 STYLE 'BT'
@15,26 say 'Developed by:Kamaldeen Nuhu(PGD/MSD/97/98/655)' FONT 'ITALIC', 10
STYLE 'BT'
@16,40 say 'Department of Maths/Computer Science ' FONT 'ITALIC', 10 STYLE 'BT'
@17,40 say 'Federal University of Technology Minna, Niger State ' FONT 'ITALIC',
10 STYLE 'BT'

@18,30 GET mchoice FUNCTION '*H Exit;Continue ';
DEFAULT 1 SIZE 1.5, 10, 5
READ
DO CASE
    CASE mchoice = 1
        QUIT
    CASE mchoice = 2
        DEACTIVATE WINDOW main
        CLEAR
        SET COLOR TO
        RETURN
ENDCASE
DEACTIVATE WINDOW main
CLEAR
SET COLOR TO
RETURN
```

```
PROCEDURE occnew
CLOSE ALL
HIDE MENUS ALL
HIDE POPUP newrec
DEFINE WINDOW pnew FROM 2,2 TO 30,80 PANEL COLOR RB+/B+ TITLE ' DATA ENTRY FOR
NEW OCCUPANT '
ACTIVATE WINDOW pnew
USE C:\COAM\COAM
DO WHILE .T.
    go top
    CLEAR
    store space(15) to mocc_name
```



```
store space(10) to mhno
store space(10) to mhtype
store 0.00 to mpay
store 0.00 to mhcost
store 0.00 to mmon_bill
mter_date = CTOD('  /  / ')
ment_date = CTOD('  /  / ')
```

```
@3,5 SAY 'HOUSE NUMBER:' GET MHNO
READ
```

```
IF MHNO = SPACE(10)
    clear
    @16,15 SAY 'House number can not be blank '
    @17,15 SAY 'Press any key to continue'
    wait ' '
    clear
    RETURN
ENDIF
```

```
LOCATE ALL FOR UPPER(MHNO) = HNO
IF FOUND()
    clear
    @16,15 SAY 'House number already exist'
    @17,15 SAY 'Press any key to re-enter'
    wait ' '
    clear
    LOOP
```

```
ELSE
    @5,5 SAY 'HOUSE TYPE:' GET MHTYPE
    @7,5 SAY 'NAME OF OCCUPANT:' GET MOCC_NAME
    @9,5 SAY 'DATE OF ENTRY:' GET MENT_DATE
    @11,5 SAY 'TERMINAL DATE:' GET MTER_DATE
    @13,5 SAY 'MONTHLY BILL:' GET MMON_BILL
    @15,5 SAY 'COST OF THE HOUSE:' GET MHCOST
    READ
```

```
ENDIF
```

```
@25,25 GET mchoice FUNCTION '*H More;Cancel;Exit';
DEFAULT 1 SIZE 1.5, 10, 5
READ
```

```
DO CASE
    CASE mchoice = 1
        APPEND BLANK
        REPLACE HTYPE WITH MHTYPE
        REPLACE HNO WITH MHNO
        REPLACE OCC_NAME WITH MOCC_NAME
        REPLACE PAY WITH 0.00
```

```
REPLACE BAL WITH MHCOST
REPLACE MON_BILL WITH MMON_BILL
REPLACE TER_DATE WITH MTER_DATE
REPLACE ENT_DATE WITH MENT_DATE
REPLACE HCOST WITH MHCOST
```

```
CLEAR
LOOP
```

```
CASE mchoice = 2
  CLEAR
  LOOP
```

```
CASE mchoice = 3
  APPEND BLANK
  REPLACE HTYPE WITH MHTYPE
  REPLACE HNO WITH MHNO
  REPLACE OCC_NAME WITH MOCC_NAME
  REPLACE PAY WITH 0.00
  REPLACE BAL WITH MHCOST
  REPLACE MON_BILL WITH MMON_BILL
  REPLACE TER_DATE WITH MTER_DATE
  REPLACE ENT_DATE WITH MENT_DATE
  REPLACE HCOST WITH MHCOST
  EXIT
```

```
ENDCASE
ENDDO
DEACTIVATE WINDOW pnew
SHOW MENUS ALL
SHOW POPUP newrec
RETURN
```

```
PROCEDURE UPDREC
CLOSE ALL
HIDE MENUS ALL
DEFINE WINDOW pnew FROM 2,2 TO 30,80 PANEL COLOR RB+/B+ TITLE ' UPDATE OCCUPANT
RECORD'
ACTIVATE WINDOW pnew
USE C:\COAM\COAM
store space(10) to mhno
DO WHILE .T.
  go top
  CLEAR

  store space(10) to mhno

  @3,5 SAY 'HOUSE NUMBER:' GET MHNO
```

READ

IF MHNO = SPACE(10)

clear

@16,15 SAY 'House number can not be blank '

@17,15 SAY 'Press any key to continue'

wait ' '

clear

RETURN

ENDIF

LOCATE ALL FOR UPPER(MHNO) = HNO

IF .NOT. FOUND()

clear

@16,15 SAY 'Invalid House number '

@17,15 SAY 'Press any key to re-enter'

wait ' '

clear

LOOP

ELSE

store hno to mhno

store htype to mhtype

store 0.00 to mpay

store occ_name to mocc_name

store mon_bill to mmon_bill

@5,5 SAY 'HOUSE TYPE:' GET MHTYPE

@7,5 SAY 'NAME OF OCCUPANT:' GET MOCC_NAME

@9,5 SAY 'MONTHLY BILL:' GET MMON_BILL

@11,5 SAY 'PAYMENT:' GET MPAY

READ

ENDIF

@25,25 GET mchoice FUNCTION '*H More;Cancel;Exit';

DEFAULT 1 SIZE 1.5, 10, 5

READ

DO CASE

CASE mchoice = 1

REPLACE HTYPE WITH MHTYPE

REPLACE HNO WITH MHNO

REPLACE OCC_NAME WITH MOCC_NAME

REPLACE PAY WITH PAY + MPAY

REPLACE BAL WITH H COST - PAY

REPLACE MON_BILL WITH MMON_BILL

CLEAR

LOOP


```
CASE mchoice = 2
  CLEAR
  LOOP
```

```
CASE mchoice = 3
  REPLACE HTYPE WITH MHTYPE
  REPLACE HNO WITH MHNO
  REPLACE OCC_NAME WITH MOCC_NAME
  REPLACE PAY WITH PAY + MPAY
  REPLACE BAL WITH Hcost - PAY
  REPLACE MON_BILL WITH MMON_BILL
  EXIT
```

```
ENDCASE
ENDDO
DEACTIVATE WINDOW pnew
SHOW MENUS ALL
RETURN
```

```
PROCEDURE UTI
CLOSE ALL
HIDE MENUS ALL
DEFINE WINDOW pnew FROM 2,2 TO 30,80 PANEL COLOR RB+/B+ TITLE ' DELETE OCCUPANT
RECORD'
ACTIVATE WINDOW pnew
USE C:\COAM\COAM
store space(10) to mhno
DO WHILE .T.
  go top
  CLEAR
```

```
store space(10) to mhno
```

```
@3,5 SAY 'HOUSE NUMBER:' GET MHNO
READ
```

```
IF MHNO = SPACE(10)
  clear
  @16,15 SAY 'House number can not be blank '
  @17,15 SAY 'Press any key to continue'
  wait ' '
  clear
  RETURN
ENDIF
```

```
LOCATE ALL FOR UPPER(MHNO) = HNO
IF .NOT. FOUND()
  clear
  @16,15 SAY 'Invalid House number '
  @17,15 SAY 'Press any key to re-enter'
```

```
wait ' '
clear
LOOP
```

```
ELSE
```

```
@5,5 SAY 'HOUSE TYPE:'
@5,25 SAY HTYPE
@7,5 SAY 'NAME OF OCCUPANT:'
@7,45 SAY OCC_NAME
@9,5 SAY 'MONTHLY BILL:'
@9,40 SAY MON_BILL
@11,5 SAY 'PAYMENT:'
@11,35 SAY PAY
```

```
ENDIF
```

```
@25,25 GET mchoice FUNCTION '*H delete(More);Cancel;delete(Exit)';
DEFAULT 1 SIZE 1.5, 10, 5
READ
```

```
DO CASE
```

```
    CASE mchoice = 1
        DELETE
        PACK
        CLEAR
        LOOP
```

```
    CASE mchoice = 2
        CLEAR
        LOOP
```

```
    CASE mchoice = 3
        DELETE
        PACK
        EXIT
```

```
ENDCASE
```

```
ENDDO
```

```
DEACTIVATE WINDOW pnew
```

```
SHOW MENUS ALL
```

```
RETURN
```

```
PROCEDURE OCALL
```

```
CLOSE ALL
```

```
DEFINE WINDOW test FROM 5,5 TO 30,80
```

```
ACTIVATE WINDOW test
```

```
HIDE MENUS ALL
```

```
HIDE POPUP REP
```

```
USE C:\COAM\COAM
```

```
DO WHILE .T.
```

```

R = 5
GO TOP
CLEAR
@1,30 SAY 'STATEMENT OF ACCOUNT OF OCCUPANTS'
@2,2 SAY
'*****'
@3,2 SAY ' H.NO      NAME      MONTHLY BILL      PAYMENT
BALANCE '
@4,2 SAY
'*****'
C = 0
DO WHILE .NOT. EOF()

    @R,3 SAY HNO
        @R,10 SAY OCC_NAME
        @R,35 SAY MON_BILL
        @R,52 SAY PAY
        @R,62 SAY BAL

    R = R + 1
    C = C + 1
    SKIP

ENDDO
@24,30 SAY 'Press any key to continue'
WAIT ' '
CLEAR
EXIT

```

```

ENDDO
USE
SHOW MENUS ALL
SHOW POPUP REP
DEAC WINDOW TEST
RETURN

```

```

PROCEDURE OCSPE
CLOSE ALL
HIDE MENUS ALL
HIDE POPUP REP
DEFINE WINDOW pnw FROM 2,2 TO 30,80 PANEL COLOR RB+/B+ TITLE ' INDIVIDUAL
OCCUPANT '
ACTIVATE WINDOW pnw
USE C:\COAM\COAM
store space(10) to mhno
DO WHILE .T.
    go top
    CLEAR

    store space(10) to mhno

    @3,5 SAY 'HOUSE NUMBER:' GET MHNO
    READ

```



```
IF MHNO = SPACE(10)
  clear
  @16,15 SAY 'House number can not be blank '
  @17,15 SAY 'Press any key to continue'
  wait ' '
  clear
  RETURN
ENDIF
```

```
LOCATE ALL FOR UPPER(MHNO) = HNO
IF .NOT. FOUND()
  clear
  @16,15 SAY 'Invalid House number '
  @17,15 SAY 'Press any key to re-enter'
  wait ' '
  clear
  LOOP
```

ELSE

```
@5,5 SAY 'HOUSE TYPE:'
@5,25 SAY HTYPE
@7,5 SAY 'NAME OF OCCUPANT:'
@7,45 SAY OCC_NAME
@9,5 SAY 'MONTHLY BILL:'
@9,40 SAY MON_BILL
@11,5 SAY 'PAYMENT:'
@11,35 SAY PAY
```

ENDIF

```
@25,25 GET mchoice FUNCTION '*H View;Exit';
DEFAULT 1 SIZE 1.5, 10, 5
READ
```

DO CASE

```
  CASE mchoice = 1
    CLEAR
    LOOP
```

```
  CASE mchoice = 2
    CLEAR
    EXIT
```

```
ENDCASE
ENDDO
DEACTIVATE WINDOW pnew
SHOW MENUS ALL
SHOW POPUP REP
RETURN
```

```

PROCEDURE OWOC
CLOSE ALL
DEFINE WINDOW test FROM 5,5 TO 30,80
ACTIVATE WINDOW test
HIDE MENUS ALL
HIDE POPUP REP
USE C:\COAM\COAM
CLEAR
DO WHILE .T.
    store 0.00 to check
    R = 5
    CLEAR
    GO TOP
    LOCATE ALL FOR BAL > check
    IF .NOT. FOUND()

        clear
        @16,15 SAY 'No occupant is owing '
        @17,15 SAY 'Press any key to continue'
        wait ' '
        clear
        RETURN

    ELSE
        CLEAR
        @1,30 SAY 'LIST OF OWING OCCUPANTS'
        @2,2 SAY
        '*****'
        @3,2 SAY ' H.NO          NAME          MONTHLY BILL          PAYMENT
BALANCE '
        @4,2 SAY
        '*****'

        DO WHILE .NOT. EOF()

            @R,3 SAY HNO
            @R,10 SAY OCC_NAME
            @R,35 SAY MON_BILL
            @R,52 SAY PAY
            @R,62 SAY BAL

            R = R + 1

            SKIP

        ENDDO

        @R+3,5 SAY 'Press any key to continue...'
        WAIT ' '
        EXIT
        CLEAR
    ENDIF
ENDDO
DEACTIVATE WINDOW pnew

```

SHOW MENUS ALL
SHOW POPUP REP
RETURN

COMPUTERISED APPROACH TO THE MAINTENANCE OF HOUSING ESTATE

Developed by: Kamaldeen Nuhu [PGD/MSc/97/98/655]

Department of Maths/Computer Science

Federal University of Technology Minna, Niger State

Exit

Continue

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COMPUTERISED APPROACH TO THE MAINTENANCE OF HOUSING ESTATE

New Occupant

Update record

Utility

Report

New Occupant

Quit

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COMPUTERISED APPROACH TO THE MAINTENANCE OF HOUSING ESTATE

DATA ENTRY FOR NEW OCCUPANT

HOUSE NUMBER: 71
HOUSE TYPE: 1 BED ROOM
NAME OF OCCUPANT: MR. OLOGBOJO
DATE OF ENTRY: 07/07/97
TERMINAL DATE: 07/07/98
MONTHLY BILL: 200.00
COST OF THE HOUSE: 10000 .00

Microsoft FoxPro

COMPUTERISED APPROACH TO THE MAINTENANCE OF HOUSING ESTATE

DATA ENTRY FOR NEW OCCUPANT

HOUSE NUMBER: 71

HOUSE TYPE: 1 BED ROOM

NAME OF OCCUPANT: MR. OLOGBOJO

DATE OF ENTRY: 07/07/97

TERMINAL DATE: 07/07/98

MONTHLY BILL: 200.00

COST OF THE HOUSE: 10000.00

More Cancel Exit

Coam Record: EOF/6 Exclusive Ins Num Caps

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Microsoft FoxPro				
COMPUTERISED APPROACH TO THE MAINTENANCE OF HOUSING ESTATE				

H.NO	NAME	MONTHLY BILL	PAYMENT	BALANCE

55	MR. A. YUSUF	200.00	300.00	9700.00
57	MR. MAGAJI	200.00	0.00	10000.00
59	MRS. O. FRIDAY	200.00	0.00	10000.00
61	MR. C. GEOGE	200.00	0.00	10000.00
63	MRS. U. AYANI	200.00	0.00	10000.00
65	MR. ORISA O.	200.00	0.00	10000.00
71	MR. OLOGBOJO	200.00	0.00	10000.00

Coam Record: EOF7 Exclusive Ins Num Caps				
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