

**COMPUTER MAINTENANCE AND REPAIR  
INFORMATION MANAGEMENT SYSTEM**

**(A CASE STUDY OF SIMEON ODUOYE COMPUTER CENTRE,  
NIGER STATE, COLLEGE OF EDUCATION)**

**BY**

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**IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE  
AWARD OF A POST-GRADUATE DIPLOMA IN COMPUTER SCIENCE**

**NOVEMBER, 2004.**

## DECLARATION

I hereby declare that this project "Computer Maintenance and Repair Information System" is an authentic work of mine, and has not been presented elsewhere for the award of any certificate.

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Nwachukwe Ejima Owelle

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Date

## CERTIFICATION

This is to certify that this project captioned "Computer Maintenance and Repair Information Management System" was undertaken by Nwachukwe Ejima Owelle of the Department of Mathematics and computer Science, Federal University of Technology, Minna meeting the requirements / regulations governing the award of Post-Graduate Diploma in computer science of the Federal University of Technology Minna.

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(Head of Department)

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Date

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External Examiner

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Date

## DEDICATION

I dedicate this piece of work to God Almighty. For I cannot comprehend this strength, Love, care and guidance, and above all supplying all my needs during the course of this project.

Thus the Bible Says "that, as it is written, "he who glories, let him glory in the Lord". I Corinthians 3:31.

## ACKNOWLEDGEMENT

I would like to use these opportunity to acknowledge my supervisor, Prof. K.R. Adebouye, for his care, tolerance, understanding and who out of his busy schedule still had time to guard me to make this project a success and to the H.O.D, lecturers and members of staff, of the Department of Mathematics and computer science, F.U.T, Minna, for all the time and support during the course of this program.

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Apart from my family, it would be out of place not to acknowledge the efforts of others who have also contributed immensely in various ways to see that my completion of this project an program is actualized; they are: Miss Blessing N. Ogar, Mr. Philip Oyok, Mr. Johnson Ajobghuku, Pastor Felix Edionwe, Pastor Harrish, Mr Lawrence Elijah, Maria (Calabar) and all others whose names have not mentioned. You all are so dear to my heart and I will not fail to utilize this medium to say how grateful I am to each and every one of you for all you have done.

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Finally I wish to place on record, with gratitude, the support of my brother, Mr. Emmanuel O. Owelle & Family who God used to support me financially and otherwise during the course of this project and program. And to say thank you all and may God continue to shower his blessings on each and every one of you.

May God be glorified in all things.

## ABSTRACT

This project is about the effective management of computer maintenance and repair information. It examines the needs for proper maintenances and repair of computers as well as effective use of the information obtained from the maintenance work.

However, a computer-based information system on maintenance and repair of the computer equipment was developed.

Since these equipments consist of electronic components: transistors capacitors, resistors and of course integrated circuits or microchips, a database for these components with their equivalent (alternatives) are incorporated.

From the database, statistics of computers that developed fault and frequency of such occurrences for a given period of time would be generated to facilitate decision-making.

On the whole, this project is aimed at improving the maintenance and repair culture not only of the Computer Centre, Niger State of education, Minna but of any other establishment or organization charged with similar responsibilities.

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## CHAPTER ONE

### 1.0 INTRODUCTION

The common theme or the general thoughts through all different uses of computers is that they are employed by public and private organizations because they can perform various tasks more effectively and therefore more economically i.e. they reduce waste and hold down the cost of labor, energy and paperwork. Thus computers increase productivity and reduce the cost of goods and services than other machines or people.

However, the personal computer did not become a reality until progress was made in microelectronics produces microcomputer, based microprocessors and storage chips and interfaces to cheap and small-scale terminals.

The continued development of the microprocessor as led to more powerful models appearing in the market today, primarily from companies such as Intel, Advanced Micro Device (AMD), Cyrix, IDT, Rise Technologies etc. these models are described by the size of unit of data that can be carried through the processor; thus the first widely available micros were 8-bit micros, most commercially microcomputers are based on 16-bits microprocessor and the latest 32-bit microprocessors are now being used to produce single or multi-user microsystems that rival in power and performance in the current competition from smaller mainframe computers and minicomputers

Meanwhile the original 8-bit micros are available at such a low cost that they can represent a potential monitoring and control components inside many other electronic or electromechanically systems, e.g. car controls, heating systems e.t.c.

## **1.1 AIMS AND OBJECTIVES**

This project is aimed at achieving certain technical and management goals. Some of which is facilitating decision making as regards the type of model of computer to acquire or use. This can be achieved by determining the behavior of various types of these computers in the aspects of maintenance requirements, failing parts and performance would reveal some characteristics of these computers.

Therefore, the main objective of this project is to carry out a careful study of the various types of computers by keeping accurate records of their problems – failing parts and other routine maintenance. By this way, it could eventually be necessary to compute the frequency of their respective breakdowns and also, take note of the components or parts that fail more often.

Such information can be used to decide on the type of computer to purchase and parts whose stock should be kept in anticipation of their failure.

However, computer consultants would at one time or the other be contacted to advise on the type of computer to be used or acquired by an organization; apart from the processor speed, storage capacity, display e.t.c, the consultant must put into consideration the durability of the system to recommend. Parts that fail mostly after sometime could be recommended to the management of the organization from the knowledge - based system to place order for such parts to enable quick replacement thereby reducing the computer down-time.

## **1.2 SYSTEM OVERVIEW**

The case study of this project which is Simeon Oduoye Computer Centre, Niger State College of Education, Minna is an organ of the college. The centre was

commissioned by the then Military Administrator C.P. Simeon O. Oduoye on the 11<sup>th</sup> of August 1998. The centre has more than twenty (20) personal computers and a good number of related equipment to its credit.

The Centre is charged with various responsibilities. Some of these includes the following:

- (a) provides computer training and employment for suitable Nigerians.
- (b) Offer computer services to the college community
- (c) Provision of computer practical facilities for students of the college.
- (d) Offer computer services to reputable organizations
- (e) Procure, assembly, install and repair computer equipments.

The Computer Centre has two computer laboratories under the Computer Science Department and is headed by the Head of Department (H.O.D.) Computer Science. The Centre is made up of basically three sections namely: Operations, System Development And Maintenance.

One of the computer laboratories is used in training of NCE (National Certification of Education) Computer Science Students; offers Certificate and Diploma programmes in computer which are under consultancy; it is also used for workshops and seminars. The other computer laboratory services as an Internet café/business centre.

**Head of Department (H.O.D.):** The Computer Centre is headed by the Head of Department, Computer Science who oversees all the various activities of the computer centre and department as a whole.

**Director:** The director coordinates the activities of the three sections that make up the Computer centre and reports to the Head of Department.

**Operation Manager:** The Operation Manager is responsible for the continuous operation of the computers, peripherals, disk e.t.c and reports to the Director.

**Computer Operators:** The Computer Operators supervises student's practicals and interacts with the computer via keyboard to process jobs and produce reports (output) and reports to the Operation Manager.

**Chief System Analyst:** Charged with the responsibilities of coordinating the system development activities amongst analysts and programmers; and reports to the Director.

**Analyst and Programmers:** These are basically people who produce system/application programs and maintain existing ones both for the College community and reputable organizations that may request for the services.

**Technical officers (Service Engineers):** Coordinates computer hardware maintenance and repair activities, they are also responsible for troubleshooting faulty computers, and carrying out maintenance and repair on them. They report to the Director.

Appendix I shows the organizational structure of the Simeon Oduoye Computer Centre, Niger State College of Education, Minna.

### **1.3 PROJECT SIGNIFICANCE**

Ever since manufactured computers were first introduced, it has been generally accepted without question that, before they are released to customers, the

manufacturers should establish that it has been assembled correctly and is doing what it was intended to do.

For a long time, and for very many computers, the implementation of this concept has not been seen to present any particular problems; test and maintenance procedures could be formal, based on intuitive understanding of the computer by quality control and maintenance department.

Even so, for a simple system such as radio, additional performance criteria can be suggested on an intuitive basis; perhaps just a subjective assessment of sound quality obtained from one station on each waveband. This can be augmented with objective measurements such as frequency responses.

Now, the problems become more severe when the system that we are dealing with intended to perform data processing, operating on data supplied to the unit from an external source. Such system (computer) are nowadays large, if not entirely digital in nature.

The need for maintaining and repairing arise in connection with the maintenance of faulty computers including both the results of unsatisfactory manufacturer and parts that have failed in operation in the field.

It is important to recognize that economic considerations are at the heart of all maintenance problems. Basically, repair costs money, and good quality maintenance (i.e. that which covers a large proportion of the unit) is preferred to poor maintenance.

However, failing to maintain or maintaining adequately, also cost money in that a faulty part or computer that results from non-maintenance will nonetheless

eventually have to be put right or repaired, entailing the use of diagnosis and repair routines that cannot by their very nature be fully automated.

The cost of not maintaining therefore can be very high. In addition to labour costs for carrying out the actual repair, there are considerable administrative costs involved with any form of special treatment that takes place outside the standard or normal operation process.

## CHAPTER TWO

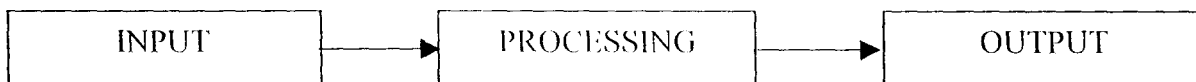
### 2.0 LITERATURE REVIEW

#### 2.1 INTRODUCTION TO COMPUTER

A computer is an electronic device/machine that can accept, store, retrieve and process data in a wide variety of ways with an extremely high degree of speed and accuracy.

Essentially, a computer performs three functions:

- (i) It receives data (INPUT)
- (ii) It processes data by various computation (PROCESSING)
- (iii) It emits data (OUTPUT)



A computer system consists of a number of components each performing a specific function. The basic components include: the input device, the central processing unit (CPU), and the output device.

These physical components of the computer are called **HARDWARE**. That part of a computer that one can see, feel or touch.

The input devices are used to enter data into the computer, this unit facilitates flow of information into the computer memory from source cards. It translates information in form acceptable to the computer. The form in which the information is translated into so as to be acceptable to the computer is Binary Numbers. Some common input devices are the keyboard, tape drives, and light pen.



The central processing unit (CPU) referred to as the heart of the computer. This part controls this part controls the activities and various operation taking place in the computer. The CPU has three units. These are control unit (CU), the Arithmetic/Logic unit (ALU) and the primary storage unit.

The control unit (CU), performs two primary functions:

- (i) decoding program instructions.
- (ii) Generating control signals to direct and control other devices attached to the computer.

The Arithmetic / Logic unit (ALU), is primarily for carrying out arithmetic calculations and performs comparisons on two data values. This capability for performing comparison or logical operations gives the computer a great deal of decision - making power.

The arithmetic/logic unit like the control unit contains registers for holding data temporarily.

The primary storage unit is the component of the CPU that temporarily stores program, data and results. It is also referred to as the main memory; primary memory or internal storage and it hold programs, instructions, data and the intermediate and final results of processing.

Functionally, there are two main types of memory, the RAM (Random Access memory) and the ROM (Read Only Memory).

The output device is that unit of the computer, which yields up information. Output devices such as disk and tape drives are used to transfer data, results and

programs from the primary storage unit to secondary storage unit i.e. auxiliary storage media such as floppy disks, hard disks and magnetic tape.

The most common output devices are visual display unit (VDU), printers (for hard copy). Other output devices are video screen or monitor. Other names for a monitor are CRT (Cathode Ray Tube) and (VDT) Video Display Terminal)

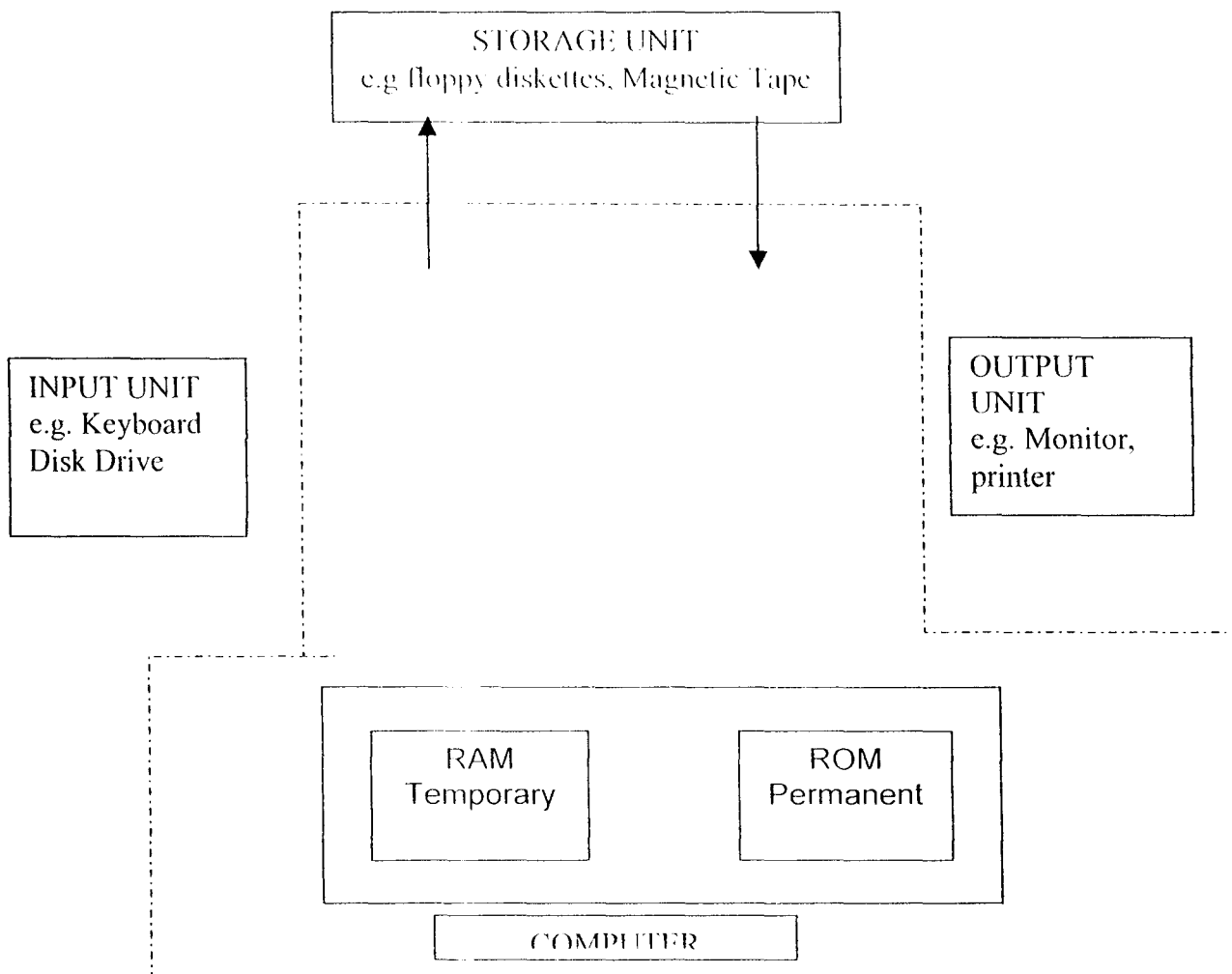


Fig. 2.1 Showing basic components of a computer

## 2.2 OVERVIEW OF SEMICONDUCTOR TECHNOLOGY

A semiconductor is a substance that conducts electricity in certain conditions, but not as well as metals.

Today, microprocessors are available in many different technologies such as the Intel processors, the MMX technology which is named for multimedia extensions, of matrix maths extensions, other includes the Advanced Micro Devices (AMD) processors, Cyrix processors e.t.c.

Many of the characteristics of a semiconductor technology affect the property of the resulting manufactured processors. Among the significant characteristics are:

- (i) Speed: The delay of a gate (Components) is a common measure of speed. If the delay is short, the microprocessor can decode instructions; perform arithmetic, and calculate address rapidly. The speed of technology depends on switching time (i.e. time required to change from one logic state to other).
- (ii) Power consumption: The operating power requirement of a technology determines the size of the needed power supplies and the amount of heat that is produced during operation. The stand by power requirements determines how much power is needed to retain during periods when the microprocessor is not operating. A measure of power consumption is the power dissipated in a gate.
- (iii) Density: The typical size of a gate is a measure of density. Very dense technologies can produce single-chip microprocessors that are cheap to manufacture, small size and require few connections or additional components.

Other significant characteristics include Ruggedness and TTL compatibility (Transistor – Transistor logic compatibility) e.t.c.

## 2.3 TROUBLE SHOOTING

Like automobiles, computers break down after a lot of use. Some break down sooner than others. Finding out what broke can be easy or difficult, depending on your understanding of how to analyze a problem, identify the failed part, and step toward the correct repair.

Imagine for a moment that you're in the midst of printing a lengthy analysis report when suddenly the printer halts, the video display unit (VDU) or monitor goes blank and say a computer such as the IBM PC ceases to function. What do you do? What failed?

The subject we often wish we could avoid or ignore is trouble. Trouble is like a flat tyre: no one wants one, but when it occurs we all wish we could fix it quickly and put the experience behind us. Knowledge and action are required to overcome trouble.

We know that by reading the owner's manual that came with the computer, it's a digital machine, it operates in binary where every condition is either true (logic 1) or false (Logic 0). A fault can occur in a computer system; and the term fault is any physical condition that causes incorrect output in a computer system when a circuit is exercised to perform a function.

Thus an interesting deductive technique, which is particularly appropriate for solving computer system trouble/problems, is called "Troubleshooting". A professional

approach requires gathering clues and applying deductive reasoning to isolate the problem.

Infact, troubleshooting and repair can be relatively simple if you know how the system should operate and understand how electronic components fail.

## **2.4 COMPUTER MAINTENANCE IN NIGERIA**

The maintenance and service of computers have not received the much desired attention in Nigeria. This gave rise to the considerable number of computer staying idle today. Let us not forget that the computer is as important as what it does or its applications in the diverse disciplines.

One way of dealing with this problem is to appoint permanent on-site maintenance staff and equip them with appropriate maintenance test, and service equipment (i.e. tools and devices). So that helped by gradually acquired knowledge of the particular installed system and its habits and peculiarities, they can keep the system running with a minimum of down-time. This arrangement is certainly effective but it is also expensive; an installation has to be large or very large to justify it.

With the more usual arrangement, where field-service Engineers have to deal with system failures as they arise. The problems of fault diagnosis and repair have to be faced. One technique that has traditionally been widely used is "board swapping", based on the ideas that the field Engineer, equipped with a complete spare set of boards, or parts simply changes the board or part in the system one by one until the fault disappears.

The board or part that have been removed, at least one of which is presumably faulty, are then returned for repair to a central maintenance workshop or section which can now be a gradual process.

It is a matter of fine economic judgment to choose the quantity and quality of maintaining, such that the cost of this maintenance is particularly less than the consequential cost of not maintaining.

## CHAPTER THREE

### 3.0 SYSTEM ANALYSIS AND DESIGN

#### 3.1 SYSTEM ANALYSIS

##### 3.1.1 PROBLEM DEFINITION

The project title is "Computer Maintenance and Repair Information Management System".

##### 3.1.2 SCOPE OF STUDY

The scope of study focuses mainly on how to effectively manage the information on computer maintenance and repairs in order to use such information or records in decision-making process relating to computer hardware management.

##### 3.1.3 METHODOLOGY

The methods employed during fact-finding were interview and observation.

##### 3.1.4 FEASIBILITY STUDY

This is a systematic way of carrying a study of any given system to uncover its procedural, technical and operational bottlenecks with a view to proffering solutions to such problems.

**A. Procedure:** This is the method used to collect data during investigation, which includes personal interview and observation. The mentioned methods of data collection which is somehow strenuous and time-consuming are simply the most

effective ways of gathering information; because they provide reliable and accurate data. Nonetheless it was also possible to use observation method for data collection.

**B. Findings:** Using the two fact-finding methods, the information gathered about the present system during the investigation are as follows:

**Observation:** Which gives accurate information about the activities of a system?

(1) Computers are regularly brought to the section for maintenance and repair almost every week.

(2) Maintenance personal are some times invited to carry out maintenance and repair in other departments or even outside the college community.

(3) Records on these maintenance activities are being kept in note books.

**Personal interview:** This is a fact-finding methods employed to collect information directly from individual or group. But in this case, majority of the respondents were from the computer center and most especially from the maintenance section of the department.

(1) Question: Did anytime ever happen to these  
note books?

Answer: These note used over a period of time will definitely get  
torn or misplaced.

(2) Question: The records being kept in the note books, how useful  
are they?



Answer: They are only to document the maintenance activities.

(3) Question: How strict is access to records of maintenance?

Answer: To be candid with you, whoever comes across the record book accesses it.

(4) Question: Are you now saying that anyone who some across it can alter these data?

Answer: Perhaps that could be possible, as you said, by chance.

(5) Question: Are the expenses of maintenance and repairs taking into consideration?

Answer: I would say not quiet, because the expenses are not actually taking into consideration.

**C. Conclusion:** One can conclude from the investigation that, actually the maintenance section carries out a lot of maintenance and repair works. But the system has indeed suffered bad records keeping and the financial records are not well accounted for, which can lead to misappropriation of funds. Besides, access to the records has no control and they have not devised any meaningful way of using the information being recorded.

**D. Recommendations:** From the conclusion drawn, it is strongly recommended that a computer- based information management system be developed to improve records keeping and also serve as a decision support system.

In addition, speed, quality and volume of information to be supported by the proposed system will definitely be helpful and the financial records will be well accounted for.

Finally, proper access and data control will be mounted (i.e. creating a password for the proposed system) to ensure data security and integrity thereby enhancing system reliability.

### 3.2 COST/BENEFIT ANALYSIS OF THE PROPOSED SYSTEM

This establishes relationship between the cost of developing a system and benefits derivable from the implementation of the new system, which is shown below, at a glance estimate of the proposed system.

System development cost:	N	:	K
- System analysis and design	10,000	:	00
- Software acquisition/development	35,000	:	00
- Computer procurement/ installation	—		
Operating Cost:			
- File conversion	2,000	:	00
- Staff training	5,000	:	00
- Stationery	1,000	:	00
Net Benefit	60,000	:	00
Total	113,000	:	00

#### Benefits:

- Timeliness of report	20,000	:	00
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- System accuracy	50, 000	:	00
-Decision support services	100, 000	:	00
Total	170, 000	:	00

Note that from the above that the procurement and installation cost was actually reduced to zero (nil) because the department already has the computer system meeting the proposed system hardware and software requirement.

Given from the above analysis, we can say that the management will save about sixty thousand Naira (N60, 000) only annually; which is the net benefit of the proposed system in the analysis shown above.

### 3.3 SYSTEM DESIGN

Increasingly, in transaction processing systems, forms and documents are being replaced by screen layouts for visual display units. The design considerations, however, are often similar; the major concern being the reactions of users to particular formats.

The major design consideration is which format will be convenient for the users and will make it as simple as possible to enter the data correctly.

To design a model that best describes an effective way of managing information on "Computer Maintenance and Repair" in such a way that meaningful ideas could be deduced or derived from the information managed by the system.

Though, certain constraints are involved, which include time available for the completion of the project and the cost of executing the project. But notwithstanding,

an efficient and reliable system must be designed and implemented by the end of this project.

However, the technical and operational feasibility of the proposed system would not generate any problem in this project, because the equipment and manpower required are readily available as such no extra cost will be incurred in that regards.

### 3.3.1 SYSTEM REQUIREMENTS AND SPECIFICATION

The following computer configuration for the new system would be required for it to work efficiently and with high level of reliability. But the selection is purely based on the needs of the new system objectives with respect to the volume and nature of data to be processed so as to meet up with the challenges ahead.

**Hardware:** The hardware configuration for the proposed system is as follows:

Machine	-	PC Compaq or IBM
Microprocessor	-	Pentium 111 447 MHz
RAM	-	128 Mb
Hard – disk	-	10 Gb
Floppy disk drive	-	1.44 Mb
Monitor	-	S. V. G. A
Keyboard	-	102 Enhanced
Printer	-	hp LaserJet 1200
Power Source	-	Uninterrupted Power Supply (UPS)

**Software:** Since the proposed system is designed to operate in DOS environment, below is the system software enquired to facilitate the operation of the new system.

- Pre – installed DOS
- Pre – installed QUICK BASIC (Q BASIC)

### 3.3.2 OUTPUT DESIGN

Different reports are actually to be expected at different levels from the new system. These reports although may be produced on the screen or printer includes the following:

- (i) Maintenance report.
- (ii) Electronic Components data report.
- (iii) System (computer) information report.
- (iv) Statistical report on computer maintenance.

The on– screen cost report will be provided to minimize cost of printing. The on– screen reports will therefore be available in the system in form of enquires in maintenance, components data, Bank and system. Information menu respectively.

However, the reports menu of the system will provide room for producing hard copies of the reports.

- (i) Maintenance Report: In this report, details of various computer maintenance and repairs activities entered into the file are printed.

Name of the organization

Report Name

Date:

Page No:

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Computer	Fault	Action
x x x x x x x	x x x x x x x x x x x	x x x x x x x x
x x x x x x x	x x x x x x x x x x x	x x x x x x x x
x x x x x x x	x x x x x x x x x x x	x x x x x x x x
x x x x x x x	x x x x x x x x x x x	x x x x x x x x
x x x x x x x	x x x x x x x x x x x	x x x x x x x x

(ii) Electronic components data report: This report produces hard copies of electronic components contained in database file.

Name of the Organization

Report Name

Date:

Page No:

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Component Code	Component Description	Replacement
x x x x x x x	x x x x x x x x x x x	x x x x x x x x
x x x x x x x	x x x x x x x x x x x	x x x x x x x x
x x x x x x x	x x x x x x x x x x x	x x x x x x x x
x x x x x x x	x x x x x x x x x x x	x x x x x x x x
x x x x x x x	x x x x x x x x x x x	x x x x x x x x

(iii) System information Report: Information about all the computer models being handled by the system will be printed using the format below.

Name of the Organization

Report Name

Date:

Page No:

Computer Code	Computer Description	Date of registration
x x x x x x	x x x x x x x x x x x x	x x x x x x x x x x x x
x x x x x x	x x x x x x x x x x x x	x x x x x x x x x x x x
x x x x x x	x x x x x x x x x x x x	x x x x x x x x x x x x
x x x x x x	x x x x x x x x x x x x	x x x x x x x x x x x x
x x x x x x	x x x x x x x x x x x x	x x x x x x x x x x x x
x x x x x x	x x x x x x x x x x x x	x x x x x x x x x x x x

(iv) Statistical report on computer maintenance: To produce this report, we must compute breakdown frequency and the percentage breakdown frequency for each computer using the following expressions.

Total computer breakdown frequency,

$$T_f = \sum_{i=1}^n f_{(i)} \text{ ----- eqn (1)}$$

Individual computer breakdown frequency,

$$I_f = \sum_{i=1}^n f_{(i)} \text{ ----- eqn (2)}$$

Where: i = Control variable

n = Number of types of computes

from eqns (1) and (2), breakdown ration for each computer is

$$I_{pr} = \frac{I_{f(i)}}{T_f} \times 100 \text{ ----- eqn (3)}$$

Name of Organization

Report Name

Date:

Page No:

---

Computer Code	Computer Name	Breakdown freq.	Percentage
x x x x x x x	x x x x x x x x x x	9 9 9 9	99.9
x x x x x x x	x x x x x x x x x x	9 9 9 9	99.9
x x x x x x x	x x x x x x x x x x	9 9 9 9	99.9
x x x x x x x	x x x x x x x x x x	9 9 9 9	99.9
x x x x x x x	x x x x x x x x x x	9 9 9 9	99.9
x x x x x x x	x x x x x x x x x x	9 9 9 9	99.9

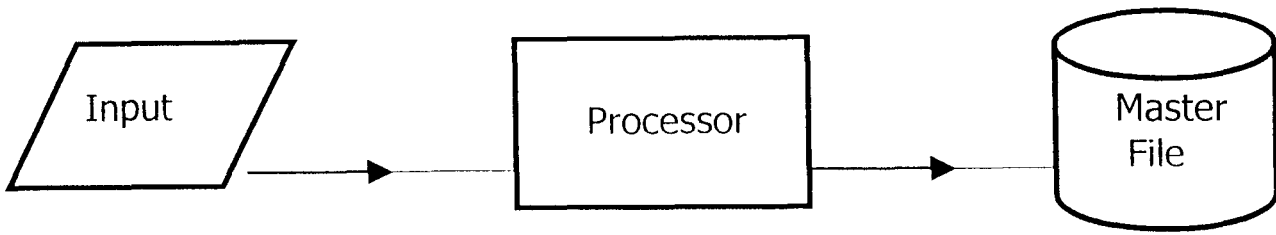
### 3.3.3 PROCESS DESIGN

The processing here includes input, enquiry, statistical computation and reports. It however, relevant to establish relationships between files as used by the system.

The system flowchart approach is the technique which would be used to establish the relationship between the files.

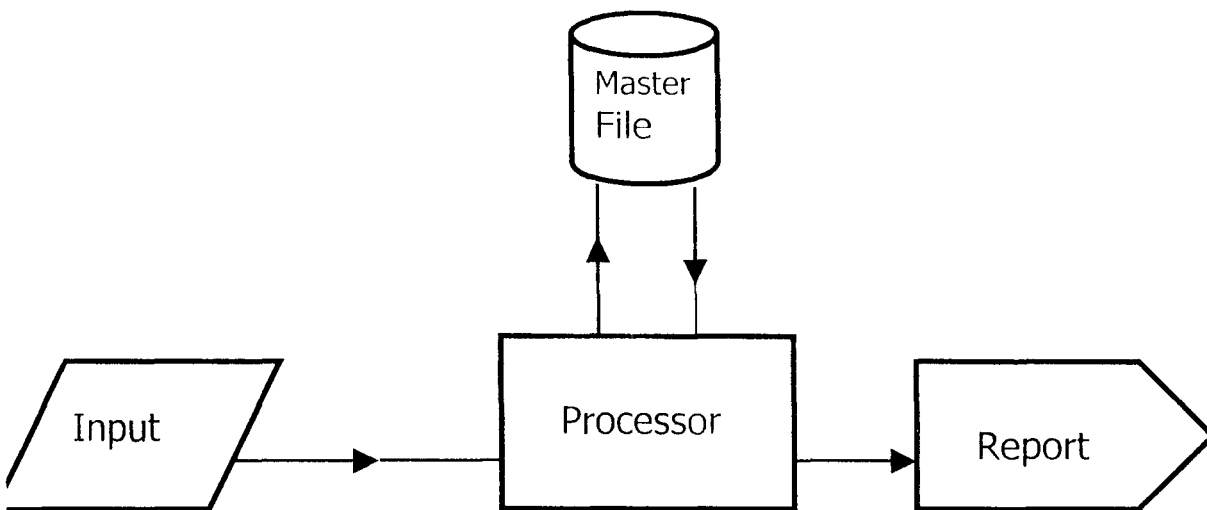


(1) Input processing system flowchart



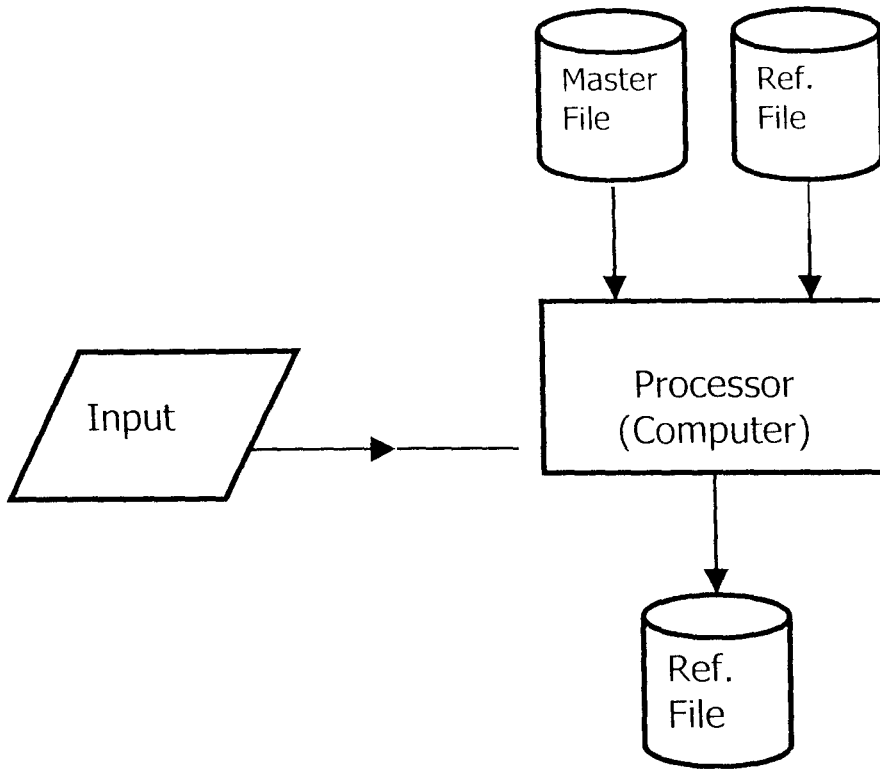
In the above flowchart, the keyboard is the input device, through which data are entered into the computer and stored on a disk.

(ii) Enquiries processing system flowchart



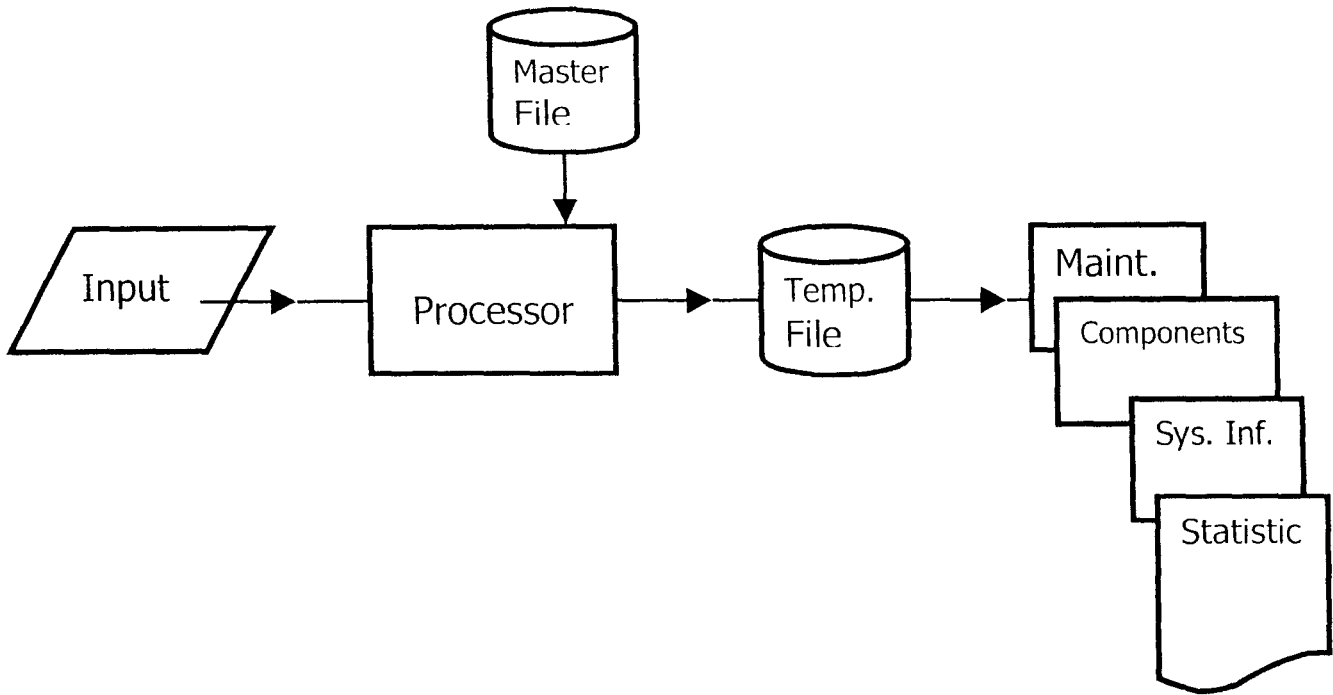
Enquiries are made via the keyboard to the computer, which obtains information from the master file and sends the same to the screen.

(iii) Statistical computation processing system flowchart



During the statistical computation, data are obtained from both the master and reference files processed and the information stored in reference file.

(iv) Report processing system flowchart



To obtain or print report in any case, request is made via keyboard to the computer (processor) and information obtained from master or reference file (or both) is directed to a temporary file and then printed.

### 3.3.4 INPUT FORM / FILE DESIGN

The definition of the information that appears on the system is outputs (visual or printed) enabled one to design the input data required for their preparation.

The number of characters a file holds can be found by multiplying the record size by the number of records in the file. For example, if we expect that the files to be used by this system will have approximately two thousand items, three million characters of data if the record size is about 1,500 characters each. And in this case, we are going to maintain three of such files as master files.

Also temporary (report) files will be required by the system in each case; this surely doubles the storage capacity required.

Therefore; if six files of three million characters each are envisaged, then the system must have minimum secondary storage capacity of six million bytes ( 60MB).

As such, an optimal secondary storage capacity of 10 billion bytes (10Gb) was earlier recommended for the system under system configuration in system requirement specification (as seen in 3.3.1 ).

This is because the pre- installed programs like the Q- BASIC AND MS – DOS prompt would be used along with the new system which will occupy storage space among other programs

(i) **Form Design:**

This describes the pattern or layout of various types of computer forms to be used in the most acceptable fashion to facilitate file conversion process.

Below are the various forms designed to be used by the new system.

(i) Maintenance and Repair data input form

Code	Comp. Name	Fault	Action	Date	Init.	Remark
x x x x x	x x x x x x x x x	xxxxxxxxxx	xxxxxxxxxx	d/m/y	x x x x x	x x x x x
x x x x x	x x x x x x x x x	xxxxxxxxxx	xxxxxxxxxx	d/m/y	x x x x x	x x x x x
x x x x x	x x x x x x x x x	xxxxxxxxxx	xxxxxxxxxx	d/m/y	x x x x x	x x x x x

(ii) Electronic components data input form

Comp. Code	Description	Replacement	Remark
x x x x x x x	x x x x x x x x x x x x x x x x x x	x x x x x x x x x x x	x x x x x x
x x x x x x x	x x x x x x x x x x x x x x x x x x	x x x x x x x x x x x	x x x x x x
x x x x x x x	x x x x x x x x x x x x x x x x x x	x x x x x x x x x x x	x x x x x x

(iii) System (Computer) information data input form

Comp. Code	Comp. Name	Date – Reg.	Frequency	Percentage
x x x x x x x	x x x x x x x x x x	dd/ mm/ yy	9 9 9 9	99.9
x x x x x x x	x x x x x x x x x x	dd/ mm/ yy	9 9 9 9	99.9
x x x x x x x	x x x x x x x x x x	dd/ mm /yy	9 9 9 9	99.9

(b) Files Design:

For any database system, the definition of data base files structure is of paramount importance. The definitions being based on the information to be kept by the new system in various data base files.

Below are the components of different types of data base files to be used by the new system.

(i) Maintenance and Repair database file

Field Number	Field Description	Field type	Field size
1.	Computer code	Character	10
2.	Fault	Character	30
3.	Action	Character	30
4.	Data received	Data	8
5.	Data dispatched	Data	8
6.	Engineers initial	Character	15
7.	Remark	Character	20

(ii) Electronic components database file

Field Number	Field Description	Field type	Field size
1.	Computer code	Character	10
2.	Component Description	Character	30
3.	Replacement	Character	30
4.	Remark	Character	20

(iii) System (computer) information data base file

Field Number	Field Description	Field type	Field size
1.	Computer code	Character	10
2.	Computer name	Character	30
3.	Date Registered	Date	8
4.	Breakdown Frequency	Numeric	5
5.	Percentage estimate	Numeric	4

## CHAPTER FOUR

### 4.0 SOFTWARE DEVELOPMENT AND IMPLEMENTATION

#### 4.1 Introduction

The software development is a process of transforming the newly designed system into a computer program using a high level language or software development package.

The choice of high level language or software development package to use for coding was oriented towards database management software. This is as a result of the fact that the proposed system involves a lot of record keeping and not much of scientific computations. Hence Quick basic (Qbasic) was used as the choice of high level language or software development for the proposed system.

#### 4.2 Database Management system (DBMS)

The database management system (DBMS) is a software capable of supporting and managing an integrated database. It handles all access to database management system.

A database is a collection of logically related data elements that may be structured in various ways to meet the processing and retrieval needs of people and organization.

#### 4.3 Programming Language

The next phase is to translate the system design and specifications into instructions that can be interpreted into programs and executed by the computer into machine language. This of course is the programming phase of the system development process; though which ideas formulated in the last chapter (i.e chapter



three) are translated to reality. As earlier mentioned the programming language used is Q Basic (Q Basic) as seen as the source code in Appendix II, which it's compiler is used to access the database.

#### **4.4 Program Coding, Testing and Debugging**

##### **4.4.1 Coding**

The designs were translated into machine-readable instructions or program to be precise.

This process was straight forward because the design logic is sound and the documentation of the program is thorough. The argument is backed up by the source code provided.

##### **4.4.2 System Testing**

Once the program was entered into the computer, and test-data prepared, individual program modules were tested with various data until found satisfactory.

The entire program was thoroughly tested with all modules incorporated which was eventually found successful.

##### **4.4.3 Debugging**

The elimination of errors (bugs) from a program is known as debugging. A bug is either a syntax error (violation of one of those rules for writing instructions) or a logic error.

The test-data were judiciously compiled so that all programs and validation routines are tested. The second stage of system testing was done with live-data by several of the people who will eventually use the system. The exercise s provided an extra level of assurance that the system will work satisfactorily.

## **4.5 Operational Manual**

The operational manual is a guide on the operation of the new system. It gives step-wise refinement of how to use the new system.

### **4.5.1 Establishing Contact with the Computer**

First switch with the computer power from the mains, and switch on power protector (UPS) and wait for some seconds. Then switch on the system unit and finally the monitor (i.e visual display unit). Your computer should now be activating.

### **4.5.2 Running the Program**

Running the program is achieved by following the various steps:

- After establishing contact with the computer, security test must be passed before the user can proceed. The system will request the user to supply or enter a password. If the correct password is entered, the user then clicks on "OK".
- The graphical user interface is now displayed (GUI), we now insert the source diskette in the drive A to enter the program into the computer. Click on start, then choose programs from the pop-up menu, choose QBasic from the adjoining pop-up menu.
- When the QBasic environment is opened, press the (Esc) key on the keyboard to clear the screen. We will now see a blinking cursor.
- Click on file from the menu bar, then click on open from the adjoining pull-down menu. Then we will see another box which will pop-up; which will ask for your FILE NAME; we then go to the section written Dirs/Drives, click on

A drive to access the diskette and click on the FILE NAME in which you wish to open the program and then click –on 'OK'.

- The source code now opens, and we input the various data using the keyboard, into the individual program modules, and press F5 on the keyboard to run the program.

## CHAPTER FIVE

### 5.0 CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

#### 5.1 CONCLUSION

Computer hardware maintenance is almost always performed under contact by engineers working either for the equipment manufacturer or retailers, or form specialist maintenance companies or service department like the computer centre, Niger state college of Education, Mina-Nigeria. Their function is divided between breakdown repairs, for which they must be on call, and preventive maintenance carried out on a regular basis.

Reliability of a system (computer) is freedom from failure. Unfortunately every man-made object is subject to failure in operation, either as a result of component failing or as a consequence of something else happening outside the system. Things suddenly fail at random, and things eventually wear out. Operations without failures are of interest to every computer user and totally essential to real-time and life-support systems. This reliability has to be sought and engineered into computer systems both in their original manufacture and during their use, hence the aim of this project.

#### 5.2 Limitations

Computer systems (hardware) are liable to failures, but failure in computer hardware systems do not just occur, they are caused by various limitations, as stated below: when regular maintenance culture are not carried out on computer systems.

- Irregular power failure

- Machine malfunctioning i.e a slight malfunction of the computer hardware components can cause problems in computer operations and effect the occurrence of processing and output.
- When security is not provided, allowing unauthorized persons to access the computer.
- When virus gains access into the computer system.

All these limiting factors causes limitations in the computer system, causing the computer not to function efficiently and accurately as it ought to work and can even drainage the system entirely, hence they also affect the computer system developed in this project.

### **5.3 RECOMMENDATIONS**

Since most hardware wears out with use and age, the most essential precaution is testing hardware regularly either in time or by use, and replacing defective parts. This is known as preventive maintenance, and should reduce random or wear-out failures to a minimum the affect of which can be further controlled by holding spares and by arranging a rapid and guaranteeable repair service.

With modern electronic solid-state technology, the greater number of failures are likely to be caused by errors in software, so that reliable software and similar software maintenance procedures are equally essential, both for application and for system software.

Ultimately, and perhaps unfortunately, all computer systems rely on electrical power. The power supply to business premises, schools, homes is from time to time,

affected by situations outside our control total failure, a planned shut-off for repairs. It is therefore necessary to provide back-up power supply-either a battery which provides enough life to enable a computer system to close down in an orderly manner, or in extreme, a stand by generator which is immediately switched into use when a failure of the mains supply is detected.

Similarly, physical security measures should be mounted to prevent access and use of computer by unauthorized personnel, by means of:

1. Restricted access- locking rooms when not in use
2. Restricted use- use only by authorized names
3. Precautions against theft or sabotage with burglar and other anti-theft device
4. Precautions against fire should be anticipated by installing sprinkler system or inert gas emitters (fire extinguishers)

Finally, this work can be improved upon by introducing an automatic circuit fault detection device, with the computer software program developed in this project serving as a knowledge based system to the device from which description of faults detected and actions to be taken to correct the problems can be obtained.

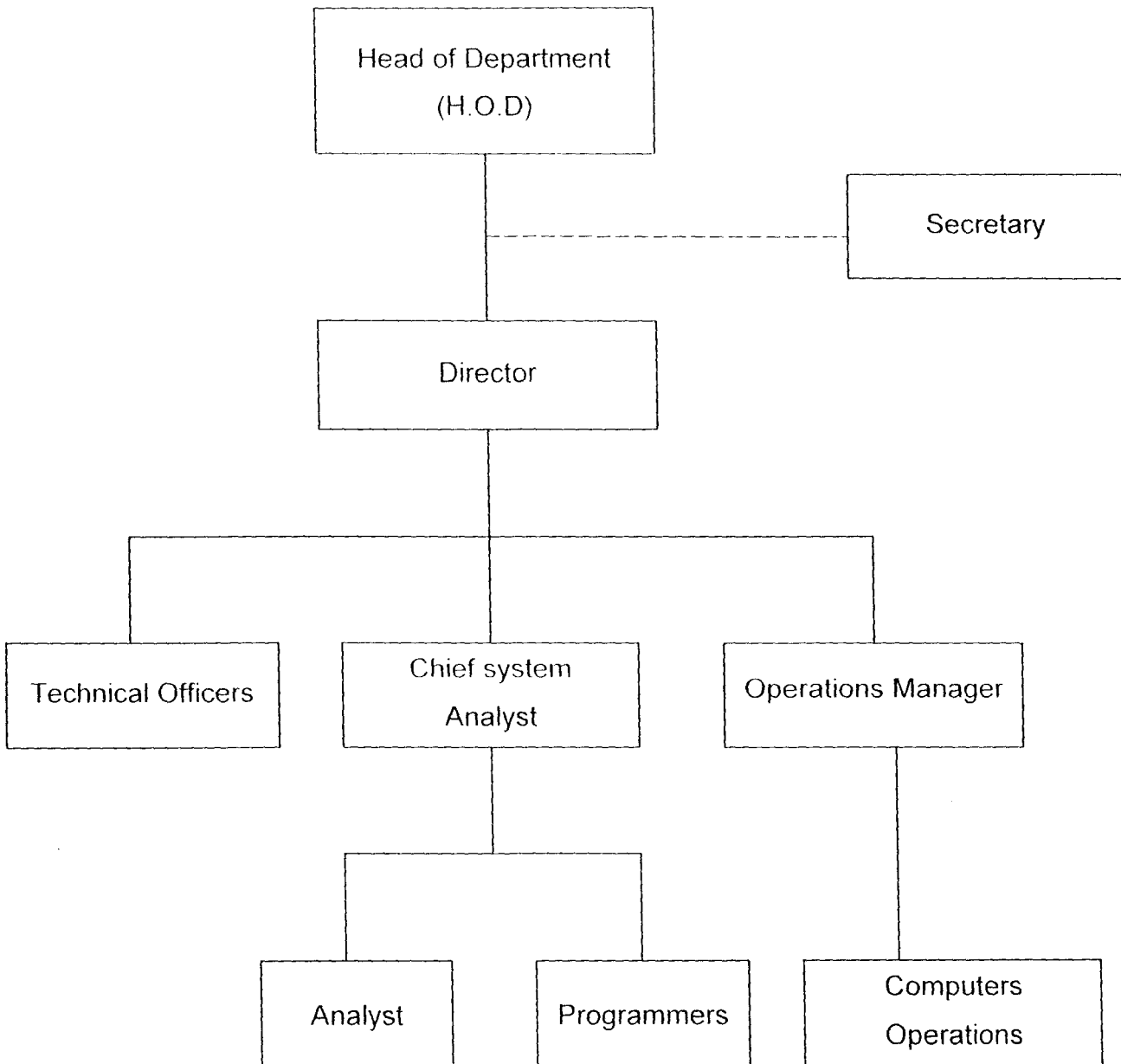


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APPENDIX I

THE ORGANIZATIONAL STRUCTURE OF THE SIMEON ODUOYE COMPUTER  
CENTRE, NIGER STATE COLLEGE OF EDUCATION, MINNA.



**APPENDIX II**  
**(OUTPUT/SOURCE CODE)**

```
CLS
LOCATE 9, 25: COLOR 6, 0: PRINT "COMPUTER SYSTEM MAINTENANCE"
LOCATE 10, 25: PRINT STRING$(20, "-")
LOCATE 12, 15: PRINT "THIS PROGRAM WAS DEVELOPED BY"
LOCATE 13, 15: COLOR 9, 0: PRINT "NAME: - OWELLE NWACHUKWU
EJIMA"
LOCATE 14, 15: COLOR 6: PRINT "REG.NO:-
PGD/MCS/2003/2004/1139"
LOCATE 15, 15: PRINT "LEVEL: - 600L-MATHS/COMPUTER SCIENCE."
LOCATE 16, 15: PRINT "SCHOOL:- SCIENCE AND TECHNOLOGY"
LOCATE 17, 15: PRINT "FEDERAL UNIVERSITY OF TECHNOLOGY MINNA"
LOCATE 18, 15: PRINT "YEAR: - NOVEMBER 2004"
LOCATE 23, 25: PRINT "PRESS ENTER TO CONT....."
    A$ = INPUT$(1)
```

50 CLS

```
LOCATE 6, 35: COLOR 9: PRINT "MAIN MENU"
LOCATE 7, 15: PRINT "1"; SPC(5); "SYSTEM RECORD"
LOCATE 8, 15: PRINT "2"; SPC(5); "PREPARE SYSTEM RECORD"
LOCATE 9, 15: PRINT "3"; SPC(5); "MASTER FILE RECORDS"
LOCATE 10, 15: PRINT "4"; SPC(5); "EXIT"
LOCATE 12, 15: INPUT "SELECT YOUR CHOICE (1-4)"; SUG
5 ON SUG GOSUB 100, 200, 60
```

60 CLS

```
    COLOR 9: PRINT "MASTER FILE RECORD"
PRINT STRING$(20, "-")
    PRINT "1"; SPC(5); "MAINTAINACE RECORD REPORT"
    PRINT "2"; SPC(5); "ELECTRONIC COMPONENT DATA REPORT"
    PRINT "3"; SPC(5); "SEE MORE MASTER'S FILE "
```

```

PRINT "4"; SPC(5); "EXIT"
INPUT "SELECT YOUR CHOICE (1-4)"; SUG
7 ON SUG GOSUB 300, 301, 70
70 CLS
LOCATE 5, 40: COLOR 9: PRINT "MASTER FILE RECORD"
LOCATE 6, 40: PRINT STRING$(20, "-")
LOCATE 7, 40: PRINT "1"; SPC(5); "SYSTEM INFORMATION DATA
REPORT"
LOCATE 8, 40: PRINT "2"; SPC(5); "STASTITICAL REPORT ON
COMPUTER "
LOCATE 9, 40: PRINT "4"; SPC(5); "EXIT"
LOCATE 12, 40: INPUT "SELECT YOUR CHOICE (1-4)"; SUG
8 ON SUG GOSUB 302, 303, 60
CLS
END

REM
PRINT "THIS PART OF PROGRAM SHOW THE INPUT"
REM (MODULUS TO RECIEVE INPUT FROM USER)
CLS
100 PRINT "SYSTEM RECORD"
PRINT STRING$(15, "-")
PRINT "1-CREAT NEW SYSTEM RECORD"
PRINT "2-TO VIEW EXISTING SYSTEM RECORD"
PRINT "3-EXIT MAIN MENU"
INPUT "ENTER OPTION (1-3) "; OPT
ON OPT GOSUB 110, 120, 50
s110 CLS
OPEN "C:SYSTEM .COM " FOR APPEND AS #1
112 K = 1
LOCATE 4, 15: INPUT "SYSTEM NAME"
"; NS

```

```

LOCATE 5, 15: INPUT "SYSTEM CODE NO           "; EMPN
LOCATE 6, 15: INPUT "SYSTEM DOS             "; DT$
LOCATE 7, 15: INPUT "DATE OF PURCHASE      "; BK$
LOCATE 8, 15: INPUT "SERIAL NO             "; AC$
WRITE #1, N$, EMPN, BK$, DT$, AC$
CLS
K = K + 1
INPUT "IS THERE ANY SYSTEM LEFT (Y/N)"; ALIU$

IF ALIU$ = "Y" OR ALIU$ = "N" THEN 112
GOTO 100
END

CLOSE #1
GOTO 100
120 CLS
PRINT "SYST. NAME", "SYST.CODE", "SYS,DOS", "D.O.P", "SERIAL
NO"
OPEN "SYSTEM.COM" FOR INPUT AS #2
WHILE NOT EOF(2)
INPUT #2, N$, EMPN, BK$, DT$, AC$
PRINT N$, EMPN, BK$, DT$, AC$

WEND
CLOSE #2
GOTO 100
REM "MODULUS TO SHOW THE PROCESSING PART"
200 CLS
OPEN "SYSTEM.COM" FOR INPUT AS #4
INPUT "SYSTEM CODE NO           "; EMPN1
'OPEN "SYSTEM.COM" FOR INPUT AS #4

```

```

WHILE NOT EOF(4)
INPUT #4, N$, EMPN, BK$, DT$, AC$
IF EMPN = EMPN1 THEN : N$ = N$: GOTO 201
WEND
PRINT "SYSTEM WITH THAT CODE NO DOES NOT EXIT"; SLEEP2: CLOSE
#4: GOTO 200
201 CLOSE #4
OPEN "C:SYSTEM.COM " FOR APPEND AS #3
235 INPUT "COMPUTER NAME      "; RE$
      INPUT "THE FAULT          "; AR$
      INPUT "THE ACTION OF THE COMPONENT: "; CA$
      INPUT "THE DATE           "; SA
      INPUT "THE UNIT           "; BO
      INPUT "REMARK             "; B$
      GP = B + RE% + CA% + AR% + SA% + BO%
      WRITE #3, B$, RE$, CA$, AR$, SA, BO, GP%
      CLOSE #3
      CLS
236 OPEN "POEDUT.COM" FOR APPEND AS #5
      INPUT "COMPONENT NAME      ":"; BC$
      INPUT "DESCRIPTION         ":"; AP$
      INPUT "REPLACEMENT         ":"; RQ$
      INPUT "REMARK             ":"; IL%
      TD = BC% + AP% + IL% + F% + SA% + SC% + SP% + RO% + W% +
FE% + NU% + SS%
      s  WRITE #5, BC%, AP%, RQ%, IL%, F%, SA%, SC%, SP%, RO%, W%,
FE%, NU%, SS%, TD
      CLOSE #5
      CLS
237 OPEN "ALLANCE.COM" FOR APPEND AS #6

```

```

INPUT "FIELD NUMBER" :"; VB%
INPUT "FIELD DESCRIPTION" :"; HA%
INPUT "FIELD SIZE" :"; LA%
INPUT "FIELD TYPE" :"; UT$
INPUT "INDIVIDUAL BREAK DOWN FREQ:"; J
INPUT "TOTAL BREAK DOWN FREQ" :"; M
TAP = VB% + HA% + LA% + UT% + J% + M% + RA% + RE% + H% +
IN%

```

```

WRITE #6, VB%, HA%, LA%, UT%, J%, M%, RA%, L%, RE%, H%,
IN%, TAP

```

```

CLOSE #6

```

```

GROSS = J / M

```

```

NET = GROSS * 100

```

```

PRINT "PERCENTAGE BREAKDOWN="; NET

```

```

PRINT "INDIVIDUAL BREAKDOWN"; J

```

```

PRINT "TOTAL BREAKDOWN"; M

```

```

CLOSE #6

```

```

280 OPEN "PMASTER.COM" FOR APPEND AS #7

```

```

WRITE #7, N$, EMPN, B%, GROSS, TD, TAP

```

```

CLOSE #7

```

```

INPUT "ANYMORE.....(Y/N)"; Q$$

```

```

IF Q$$ = "Y" OR Q$$ = "Y" THEN 200 ELSE 50

```

```

300

```

```

CLS

```

```

PRINT "MAINTAINANCE REPORT"

```

```

PRINT STRING$(50, "-")

```

```

PRINT "COPT CODE", "FAULT", "ACTION"

```

```

PRINT STRING$(50, "-")

```

```

OPEN "PMASTER .COM" FOR INPUT AS #8
WHILE NOT EOF(8)
INPUT #8, EMNP, N$, B$
PRINT N$, EMNP, B$, GROSS, TD, TAP
SLEEP 3
WEND
CLOSE #8
PRINT : PRINT
INPUT "PRESS ENTER KEY TO EXIT TO MAIN MENU"; IBRO
GOTO 60

```

301

```

CLS
PRINT "ELECTRONIC COMPONENT DATA REPORT"
PRINT STRING$(50, "-")
PRINT "COPT CODE", "COMPNT DESCPT", "REPLACEMENT"
PRINT STRING$(50, "-")
OPEN "PMASTER .COM" FOR INPUT AS #9
WHILE NOT EOF(9)
INPUT #9, EMPN, B$, N$
PRINT EMNP, B$, N$
SLEEP 3
WEND
CLOSE #9
PRINT : PRINT
INPUT "PRESS ENTER KEY TO EXIT TO MAIN MENU"; IBRO
GOTO 60

```

302

```

CLS
PRINT "SYSTEM INFORMATION REPORT"
PRINT STRING$(50, "-")
PRINT "COPT CODE", "COMPNT DESCPT", "DATE OF REG."

```

```

PRINT STRING$(50, "-")
OPEN "PMASTER .COM" FOR INPUT AS #10
WHILE NOT EOF(10)
INPUT #10, EMPN, B$, GROSS
PRINT EMNP, B$, GROSS
SLEEP 3
WEND
CLOSE #10
PRINT : PRINT
INPUT "PRESS ENTER KEY TO EXIT TO MAIN MENU"; IBRO
GOTO 70
303
CLS
PRINT "STASTITICAL REPORT ON COMPUTER MAINTAINANCE"
PRINT STRING$(50, "-")
PRINT "COPT CODE", "COMPT NAME", "BRKDOWN FREQ",
"PERCENTAGE"
PRINT STRING$(50, "-")
OPEN "PMASTER .COM" FOR INPUT AS #11
WHILE NOT EOF(11)
INPUT #11, EMPN, B$, GROSS, TD
PRINT EMNP, B$, GROSS, TD
SLEEP 3
WEND
CLOSE #11
PRINT : PRINT
INPUT "PRESS ENTER KEY TO EXIT TO MAIN MENU"; IBRO
GOTO 70
400 END

```