# DESIGN AND IMPLEMENTATION OR A RELATIONAL DATABASE MANAGEMENT SYSTEM FOR OFFICE EQUIPMENT AND CONSUMMABLES MANAGMENT (A CASE STUDY OF UNITED NATIONS DEVELOPMENT PROGRAMME, ABUJA)

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## DEDICATION

The project work is wholly dedicated to God Almighty, my parents, Mr. and Mrs. Paul Agbo and my Dear wife Mrs. Rose John Paul.

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## ABSTRACT

This project applies relational database management system to effectively manage office ICT equipments and consumables by providing such advantages as electronic storage, online collaboration, automation and optimization of ICT equipment in a user friendly interface.

# CHAPTER ONE

# INTRODUCTION

## 1.1 BRIEF OVERVIEW OF UNITED NATIONS DEVELOPMENT PROGRAMME, ABUJA

United Nations Development Programmes (UNDP) is the oldest Agency in the United Nations Systems. It has offices in all countries of the world working assiduously to achieve the Millennium Development Goals. UNDP consist of two broad divisions called Operations and Programme units. UNDP's field programmes are executed through five units namely; Poverty Alleviation and Eradication, HIV/AIDS Interventions, Communication and Business Development, Energy and Environment and Governance Units. Other support units include Resident Coordinator, Finance, Information and Communication Technology, Human Resources, Travels and Protocols, Procurement and Service Centre unit.

UNDP's activities are totally ICT driven being based on a global portal and Enterprise Resource Programme database application.

As such any UNDP office will be considered closed down if her ICT infrastructure fail or experience a downtime.

UNDP offices are also heavily equipped with computer hardware, peripherals, and networking infrastructure. There is also a heavy transaction of procurement and utilization of office consumables and equipments.

Programme staffs are field workers that travel very often or shuttle to and from partners often leasing laptops, projectors and other relevant equipment. Finally, UNDP's staff structure in every country office consist of Local staff which is made up of nationalities of the country and also international staff which consist of people of foreign nationalities.

## 1.2 BACKGROUND OF THE STUDY

The whole world thrives on information and the extent to which any society attains general advancement and development in all fields of human endeavors is a function of the quantum of information available to them. In other words it is a reflection of how much of available data they have been able to process into

useful form. Before the advent of computers, data gathering, processing, management and access was highly limited, cumbersome, error and disaster prone. The advent of the computer and by extension Information Technology has provided man with numerous solutions in data acquisition, processing, presentation and availability. First described by E. F. Codd at IBM in 1970, a relational database is a collection of data items organized as a set of formally-described tables from which data can be accessed or reassembled in many different ways without having to reorganize the database tables.

RDBMS can also be made Internet enabled so than it can be operated over the World Wide Web.

In the United Nations Development Programme Office Abuja, the office experiences a heavy constant demand of equipments and consumables. These ranges from;

- Servers, Desktops and Laptops
- Audio visuals like projectors, video conference devices, digital camera and video equipment

- Peripherals such as scanners, digital senders, stand-alone and network printers, copiers, Internet phones and fax machines
- A wide range of accompanying supply of consumables such as toners, cartridges, ribbons, papers, spare parts, etc

The processes involved in the use of these items include

- Receiving and allocation of equipment
- Discarding of failed equipment or request for upgrade
- Tracking and inventory
- Consumables utilization pattern record

Apart from instances were electronic mails are sent for communications all other processes mentioned above are carried out manually on paper. This is slow and error prone.

This project is an approach of applying the Relational Database Management System (RBDMS) to efficiently carry out these processes. It provides a customized RDBMS application to automate, speed up and simplify the routine tasks involved in management of office equipment and consumables.

## 1.3 AIMS AND OBJECTIVES OF THE PROJECT

The aim of this project is to apply relational database management system in a customized approach to the management of office ICT equipments and consumables in United Nations Development Programme Office, Abuja. Specifically, it will assist the UNDP in the following ways:

1. Enable proper record keeping and storage of information about all office equipments for the organization
2. Facilitate online collaboration amongst all staff members concerned with inventory, record keeping and equipment management
3. Automation of reports, equipment tracking and equipment state
4. Enhance optimization of computer equipments already available to the organization
5. Enhance ICT awareness in the organization at large
6. Have a reliable and stable database, where the tables are as independent as possible
7. To produce a user friendly application

## 1.4 SCOPE AND LIMITATIONS OF THE STUDY

This project covers as much features and capabilities that Microsoft Access which is the database engine used in this project allow. These are highlighted below:

- **Concurrency:** This project does not provide a database suitable for high-stress performance required by 24x7 scenarios, heavy transactions, or unlimited users. Therefore, it does not provide absolute data integrity or very high concurrency. It performs best with 10 or less concurrent users

- **Online Transaction Inconsistency:** Since we are using a file-based database engine and not a server-based, client based requests can be left unattended to with no logged record to track it thus leading to possible data inconsistency.

- **Backup:** Being file-based, two backup problems may occur: (1) if rows are modified while the backup is being performed, the backup may become corrupt; and, (2)

many backup programs would not even touch a file that is in use.

- **Modification**: It is often difficult to modify an Access database while any user has a page opened that is accessing any table within, or if another user has the MDB file open in the Access GUI. You have to copy the database, make your changes, and replace the file - waiting until nobody is on your site. This cannot be tolerated in a 24/7 environment

- **Database size:** Access does not support database files larger than 2GB. This includes not only data but also forms, macros, reports, saved queries, etc. Thus this project provides a solution that cannot be scaled beyond 2GB. Unlike applications based on SQL and other database engines, this project does not provide qualities of a mission-critical, enterprise-level database such as, high scalability,

- **Security:** Unlike other rugged database platforms that have multiple levels of configurable security, down to the object level across databases and across servers. Through the context of ASP, Access only has the ability to password (protect) a database on a single file basis. Therefore this project does not provide custom permissions per query, table or view. Also since Access is a file-based database, and since in many hosting scenarios it is just placed in the web structure somewhere, it is very easy for intruders to find the database file (by guessing its location either manually or through brute force), or trying to force an error in the application that might yield the location of the file in the error message. Then, they can download have access to the file system where the database resides.

- **Transactions:** Error transaction cannot be rolled back with Access, the user either has to use transactions from an external application, e.g. COM+ or MTS; or revert to a previous copy of the database.

- **Stored Procedures:** Access supports stored queries and not procedures. It is difficult for stored queries to access data from different databases.

- **Syntax Support:** This project may not support some codes from ASP or VB since it is based on access engine. This will limit the level of automation included.

- **Management Tools:** The user interface or form is limited in terms of active objects and forms in managing the database.

## 1.5 UNITED NATIONS DEVELOIPMENT PROGRAMME, ABUJA, ORGANIZATIONAL CHART

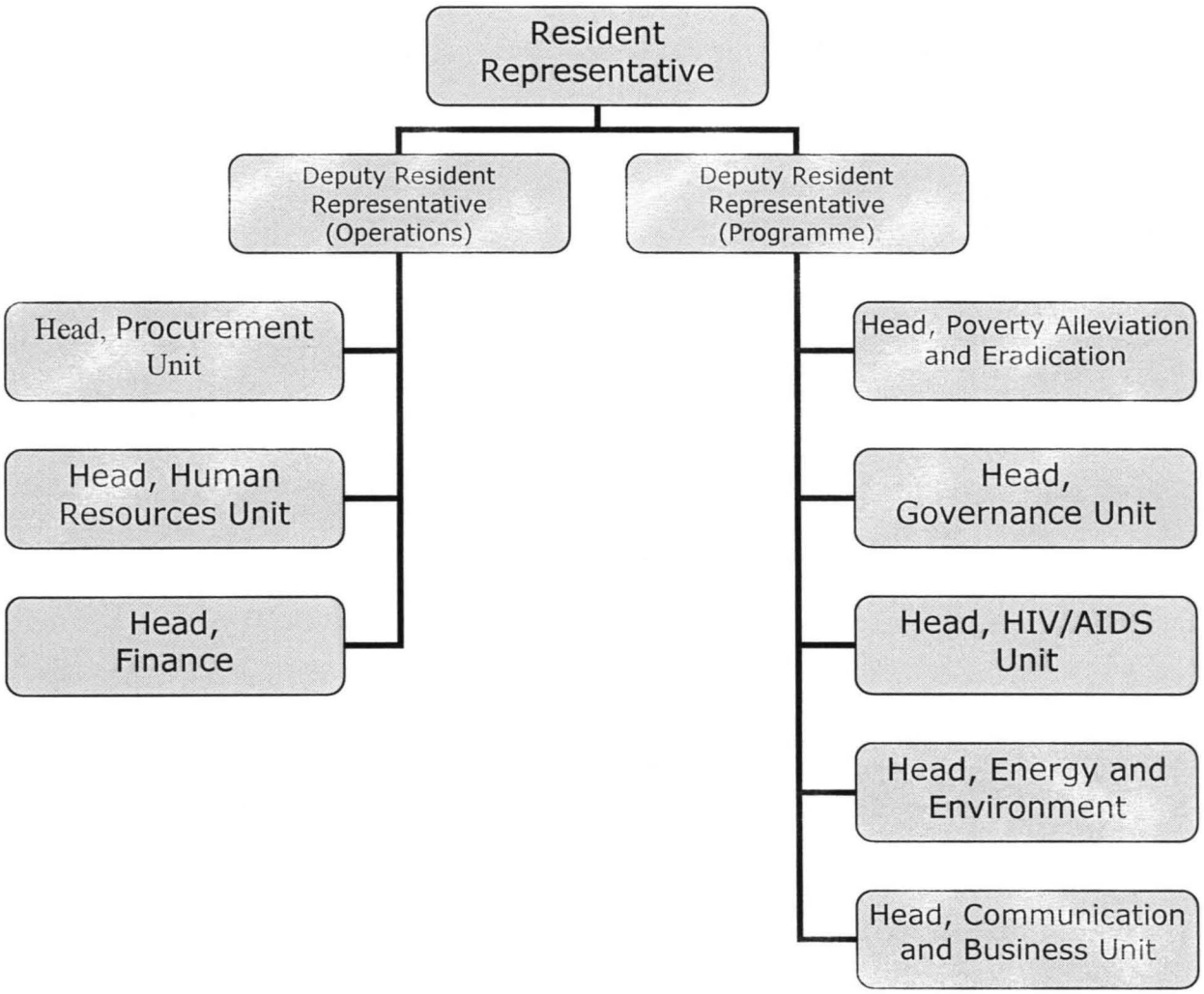



**Figure 1.5.1** United Nations Development Programme, Abuja, Organization Chart

## 1.6 PROBLEM IDENTIFICATION OF MANUAL METHOD OF OPERATION

The current processes involved in the management of office equipment are done manually by keeping records in several notebooks. These are:

- Inventory Management and Control: This includes maintaining the details of all the ICT equipment and updating it as the need may be.
- Received Items: This records new items details such as specifications, date of receipt, serial number etc
- Allocation of Items: This records the date, unit and staff member to which an item is allocated
- Lease Record books: This contains the record of staff members who lease equipment for official purposes within or outside the office premises. It records the date, purpose, the names of the requesting staff and staff responsible to the release of the item as well as the expected date of return of the item.

- Tracking of equipment and office consumables utilization.

The whole processes above are slow and disaster liable, inefficient and thus error prone. Being manual, it also limits the possibility of report generation or analysis of the whole processes involved.

## 1.7 JUSTIFICATION OF THE STUDY

In order to create a computer solution that will meet the needs of the processes identified by the current manual system as enumerated in section 1.6 above, a good database application design is imperative. This can only be achieved with a carefully planned design procedure. Ultimately, this will then lead to the computerization of the project, which affords us the following advantages;

- Saving of time and money
- Makes system more reliable
- Avoiding potential losses due to inefficiency of current system
- Providing a blueprint for future improvement
- Taking appropriately advantage to optimally utilizing the computer system of the organization

- Enhancing the ICT awareness of the organization

## 1.8 DEFINITIONS OF OPERATIONAL TERMS

**Data:** A gathered body of facts that has been translated into a form that is more convenient to move or process.

**Database**: A collection of information that is organized so that it can easily be accessed, managed, and updated.

**Relational database:** A collection of data items organized as a set of formally-described tables from which data can be accessed or reassembled in many different ways without having to reorganize the database tables.

**Relational database management system (RDMS)**: A program that lets you create, update, and administer a relational database. Most commercial RDBMS use the Structured Query Language (SQL) to access the database, although SQL was invented after the development of the relational model and is not necessary for its use.

**SQL**: SQL (Structured Query Language) is a standard interactive and programming language for getting information from and updating a database.

**Normalization:** This is the formalization of the design process of making a database compliant with the concept of a Normal Forms which addresses various ways in dealing with repeating data values in a table.

**Table:** Also called, Relation or Entity: A collection of records for a given group of items.

**Row:** Also called, Tuple or Record: A collection of fields or columns that uniquely identify a transaction.

**Column:** Also called, Attribute or Field: I single element in a record.

**Primary Key:** This consists of one or more columns whose values uniquely identify a row in a table.

**Candidate Key:** This consists of one or more columns whose values could be used to uniquely identify a row in a table. The Primary Key is chosen among a table's Candidate Keys

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 THEORY OF RELATIONAL DATABASE MANAGEMENT SYSTEM

The foundational theory of RDBMS is embodied in E. F. Codd's famous "Twelve Rules for Relational Databases"[2] which he put forward in 1970.The rules call for a language that can be used to define, manipulate, and query the data in the database, expressed as a string of characters;

Many references to the twelve rules include a thirteenth rule - or rule zero:

A relational database management system (DBMS) must manage its stored data using only its relational capabilities.

They include:

1. Information Rule

   All information in the database should be represented in one and only one way -- as values in a table

2. Guaranteed Access Rule

   Each and every datum (atomic value) is guaranteed to be

logically accessible by resorting to a combination of table name, primary key value, and column name.

3. Systematic Treatment of Null Values

Null values (distinct from empty character string or a string of blank characters and distinct from zero or any other number) are supported in the fully relational DBMS for representing missing information in a systematic way, independent of data type.

4. Dynamic Online Catalog Based on the Relational Model

The database description is represented at the logical level in the same way as ordinary data, so authorized users can apply the same relational language to its interrogation as they apply to regular data.

5. Comprehensive Data Sublanguage Rule

A relational system may support several languages and various modes of terminal use. However, there must be at least one language whose statements are expressible, per some well-defined syntax, as character strings and whose ability to support all of the following is comprehensible:

a. data definition

b. view definition

c. data manipulation (interactive and by program)

d. integrity constraints

e. authorization

f. transaction boundaries (begin, commit, and rollback).

6. View Updating Rule

All views that are theoretically updateable are also updateable by the system

7. High-Level Insert, Update, and Delete

The capability of handling a base relation or a derived relation as a single operand applies not only to the retrieval of data, but also to the insertion, update, and deletion of data

8. Physical Data Independence

Application programs and terminal activities remain logically unimpaired whenever any changes are made in either storage representation or access methods.

9. Logical Data Independence

Application programs and terminal activities remain logically unimpaired when information preserving changes of any kind that theoretically permit unimpairment are made to the base tables.

10. Integrity Independence

Integrity constraints specific to a particular relational database must be definable in the relational data sublanguage and storable in the catalog, not in the application programs.

11. Distribution Independence

The data manipulation sublanguage of a relational DBMS must enable application programs and terminal activities to remain logically unimpaired whether and whenever data are physically centralized or distributed.

12. Nonsubversion Rule

If a relational system has or supports a low-level (single-record-at-a-time) language, that low-level language cannot be used to subvert or bypass the integrity rules or constraints expressed in the higher-level (multiple-records-at-a-time) relational language

## 2.2 EVOLUTION OF RELATIONAL DATABASE MANAGEMENT SYSTEM

RDBMS was first described by E. F. Codd at IBM in 1970, In August 1969 he published his papers, "Derivability, Redundancy, and Consistency of Relations Stored in Large Data Banks" and "A

Relational Model of Data for Large Shared Data Banks," in an IBM Research Report and Communications of the ACM respectively . These gave birth to contemporary research work the relational model. Such works include the System R project at IBM Research in San Jose, Calif., and the INGRES relational prototype led by Michael Stonebraker at the University of California at Berkeley. Ten years latter the first commercial relational products appeared.

Apart from relational technology other database solutions such as IBM's IMS transaction/ database system and Bachman's network database system appeared but could not stand the test of time.

IBM released its first commercial relational database management system (RDBMS) called SQL/DS for VSE in 1981 and in 1983, IBM announced DB2 for MVS. Relational Software Inc. (now Oracle Corporation) announced its Oracle RDBMS in 1979, beating IBM to market by nearly two years. Many other key RDBMS products were released during the early 1980s,

vendors worked on adding analytical and data-mining functions to the database engine, improving performance (a never-ending task), providing easier and more automated administration, creating support for complex data (spatial, multimedia, etc.), adding integration with messaging software and providing support for Linux.

A recent move by RDBMS vendors is the addition of XML support to relational products. This involves supporting XML data, adding XML extensions to SQL and providing XML query (XQuery) capabilities. Some XML advocates even believe XQuery will replace SQL.

| **Milestones in RDBMS Evolution** |
| --- |
| **1969**<br><br>Dr. E. F. Codd publishes his first paper on the relational model |
| **1970**<br><br>UC Berkeley INGRES prototype work begins |
| **1974**<br><br>IBM SEQUEL language and prototype developed<br><br>IBM System R Prototype work begins |

| |
|---|
| **1977**<br><br>Relational Software Inc. (RSI) founded<br><br>Revised SEQUEL/2 (subsequently renamed SQL) defined |
| **1979**<br><br>**Teradata Corporation formed**<br><br>Britton-Lee, Inc. (later renamed ShareBase) formed<br><br>Oracle released by RSI (now Oracle Corporation) |
| **1981**<br><br>SQL/DS for VSE announced by IBM<br><br>INGRES for VAX/VMS announced by Oracle Corporation |
| **1983**<br><br>DB2 for MVS announced by IBM |
| **1984**<br><br>First DBC/1012 database machine shipped by Teradata |
| **1985**<br><br>Teradata acquired Britton-Lee |
| **1986**<br><br>First version of SQL standard released Sybase Inc. formed |
| **1987**<br><br>NonStop SQL announced by Tandem |
| **1988**<br><br>Microsoft, Sybase and Ashton-Tate develop Sybase for OS/2 |
| **1989**<br><br>Teradata partners with NCR Corporation |
| **1992** |

| |
|---|
| AT&T purchases NCR and Teradata |
| **1993**<br><br>Microsoft and Sybase end partnership Microsoft rebrands Sybase as<br><br>SQL Server and releases Windows version |
| **1995**<br><br>Computer Associates acquires INGRES as a part of its Ask Group<br><br>purchase |
| **1996**<br><br>Teradata Database made available for UNIX |
| **1997**<br><br>NCR becomes independent company |
| **1998**<br><br>In-database OLAP and data mining appear in RDBMSs |
| **1999**<br><br>RDBMS prepare to support Y2K |
| **2000**<br><br>RDBMS continue to add object-oriented capabilities and support for complex data |
| **2001**<br><br>Native XML support is provided for the first time in an RDBMS |
| **2003**<br><br>W3C enhances XQuery, the XML query language |
| **2004**<br><br>SQL: 2003 standard is published |

### 2.2.1 CURRENT WORKS IN RELATIONAL DATABASE MANAGEMENT SYSTEM

In the past 4 years and presently, significant progress is being made in improving the features of RDBMS to achieve higher optimal performance over the client server environment and the Internet at large. Key among these areas are as highlighted below;

- Virtual Database
- Mapping RDBMS data to/from RDF
- XML data, schemas, databases
- Relating other data - data mining?
- Searching and browsing

Server virtualization is an efficient way to save on server hardware costs but it isn't the only way. Today, virtual databases based on SQL Servers are in use as highly available MSCS (Microsoft Cluster Server) clusters.

The high points of these works is speed, reduction of database size, more effective integration, transparency, interoperability,

robustness, logical decentralization, manipulation and highly user friendly access point.Relational Database Management Systems are applied for low activity to 24-by-7 solutions for server applications, such as web, commerce, transactional, message servers, and so on.

Presently, the leading RDBMS products are

I. Oracle
II. IBM's DB2
III. Microsoft's SQL Server
IV. Informix
V. Ingres
VI. InterBase
VII. MySQL
VIII. Oracle
IX. PostgreSQL
X. Sybase IQ
XI. Teradata
XII. Visual FoxPro
XIII. Comparison - relational
XIV. Comparison - object-relational

# CHAPTER THREE

# PROGRAM ANALYSIS AND DESIGN

## 3.1 SYSTEM ANALYSIS OF THE EXISTING SYSTEM

In general, the current system is characterized by slow, inefficient and error prone; procedures, information flow pattern, organization and control methods.

For instance, the task of entering new records of the details of newly procured items, tracking office consumable utilization or tracking of equipment required manually entering the information with pen on paper. This process is inherently characterized by:

- Repetitiveness as some key data such as names, locations, etc have to be written again and again in various tables

- Maintenance of 5 different classes or record books, namely
    I. Equipment details and Inventory
    II. Equipment Tracking/Leases

III. Office Consumables supply record

IV. Office Consumables utilization record

V. Maintenance and depreciation record books

- Generation of report is cumbersome as several record books have to be consulted and records collated in order to align the components of information needed

- Only one staff member can work on a particular record book at a time thus implying a queuing condition should two or more staff members require concurrent use of the database. This often leads to lose of valuable time and man power.

**Reason For The Existence Of The Current Method;** The existing system was adopted due to the unavailability of computerization in the organization from inception as it was the optimal approach as at that time. Unfortunately, it has been maintained up till this time.

**Alternative Method To The Existing System;** Today, given the robust presence of computerized and automated office environment in the organization a very imperative alternative which must be applied to solve the problems that characterize the old system is the Relational database management System.

**Strengths of the existing method;** The old system has the advantage of its record being physically secure in the custody of the staff members responsible for it. In the proposed system proper on-line security configurations must be put in place to avoid unauthorized access and modification of the records.

It also require the physical signature of all parties involved in any given transaction for instance the leasing of an equipment to staff member who is due for mission. In the current system, there is still the need to print a hardcopy report and have the staff member sign. This is duplication of process.

## 3.2 PROBLEMS OF THE EXISTING SYSTEM

The current processes are characterized by the following problems;

- Slowness due to manual approach
- Disaster liable due to possible fire outbreak or loss of record books
- Inefficient and error prone since it is manual
- Limited scope of details, report generation or analysis which are easily achievable in a computerized system

## 3.3 ANALYSIS OF PROJECT REQUIREMENTS AND INFORMATION

The elements that are required to characterize the new system are as follows;

1. The need for the presence of computer systems and more preferably a Local Area Network environment.
2. The project would be divided into independent modules, which will be further made up of tables. Example of such modules are Equipment Tracking module, Consumables Utilization module, and Equipment Management and Inventory Control module amongst others
3. To achieve better collaboration amongst all staff members concerned with inventory, record keeping and equipment

management means, secured access should be created to only the staff concerned

4. The project must not be unduly complicated but must have a user friendly interface and should be manageable and reliable
5. Training requirement to equip users

## 3.4 BENEFITS OF THE PROPOSED SYSTEM

The proposed system brings along several desirable benefits which go beyond just being a reflection of the solutions to the problems posed by the old. Such benefits are highlighted below;

- Increased speed of operation due to replacement of manual approach
- Improved security of information due to ease of backup and provision of several images of the database at any time.
- Increased efficiency and reduction of error
- Flexibility and ease to improve scope of details, report generation or analysis which are easily achievable in a computerized system

## 3.5 DATA DEFINITION AND SYSTEM SPECIFICATIONS

The definition and specifications of the names, types and sizes of the data item of tables in the database application are shown below:

### 3.5.1 Data Definition

Table: ConsummableMaster

| Field | Data Type | Size |
|---|---|---|
| Requisition# | Autonumber | LongInt 4 |
| Requestor | Text | 50 |
| Supplier | Lookup | LongInt 4 |
| Description | Memo | - |
| RequisitionDate | Date/Time | 8 |

Table: Consummables Lists

| | | |
|---|---|---|
| Item | Text | 50 |

Table: ConsummablesXX

| Field | Data Type | Size |
|---|---|---|
| Model | Text | 50 |
| Item | Text | 50 |
| Measurement | Text | 50 |
| Qty Requested | Number | LongInt 4 |

| | | | |
|---|---|---|---|
| | Qty Received | Number | LongInt 4 |
| | Unit Cost | Number | LongInt 4 |

Table: Departments

| Field | Data Type | Size |
|---|---|---|
| DepartmentID | Autonumber | LongInt 4 |
| DepartmentName | Text | 50 |
| DepreciationID | LongInt 4 | |
| AssetID | LongInt 4 | |
| DepreciationDate | Date/Time | 8 |
| DepreciationAmount | Currency | 8 |

Table: EquipmentCat

| Field | Data Type | Size |
|---|---|---|
| EquipmentCategoryID | | LongInt 4 |
| EquipmentCategory | Text | 50 |

Table: EquipmentCodes

| Field | Data Type | Size |
|---|---|---|
| EquipmentCode | Text | 7 |

Table: EquipmentRecords

| Field | Data Type | Size |
|---|---|---|
| AssetID | LongInt | 4 |
| AssetCode | Text | 50 |
| EmployeeID | LongInt 4 | |
| AssetCategoryID | LongInt 4 | |

| | | | |
|---|---|---|---|
| | StatusID | LongInt 4 | |
| | DepartmentID | LongInt 4 | |
| | VendorID | LongInt 4 | |
| | Make | Text | 50 |
| | Model | Text | 50 |
| | ModelNumber | Text | 50 |
| | SerialNumber | Text | 50 |
| | DateAcquired | Date/Time | 8 |
| | DateDisposed | Date/Time | 8 |
| | DepreciationMethod | Text | 50 |
| | Description | Text | 255 |
| | InventoryNumber | Text | 18 |

| Table: LeaseRecord | Field | Data Type | Size |
|---|---|---|---|
| | EquipmentCode | Text | 50 |

| EquipmentCodes | Collected by | Lookup | LongInt 4 |
|---|---|---|---|
| | Unit | Lookup | LongInt 4 |
| | DateOut | Date/Time | 8 |
| | DateReturned | Text | 50 |
| | Staff InCharge | LongInt 4 | |
| | Purpose_ID | Text | 50 |
| | LocationTaken_ID | Text | 50 |

| | | | |
|---|---|---|---|
| | Equipment | Text | 50 |
| | Collected by | Lookup | LongInt 4 |

Table: Location

| Field | Data Type | Size |
|---|---|---|
| Location | Text | 50 |

Table: Make

| Field | Data Type | Size |
|---|---|---|
| Make | Text | 50 |

Table: MeasurementUnits

| Field | Data Type | Size |
|---|---|---|
| Measurement | Text | 50 |

Table: MntnceDate&Cost

| Field | Data Type | Size |
|---|---|---|
| MaintenanceDate | Date/Time | 8 |
| MaintenanceCost | Number | LongInt 4 |
| MaintenanceID | Autonumber | LongInt 4 |

Table: MntnceDscrptn

| Field | Data Type | Size |
|---|---|---|
| MaintenanceID | Autonumber | LongInt 4 |
| MaintenanceDescription | Text | 255 |
| AssetID | Number | LongInt 4 |
| Company | Text | 50 |

Table: MntnceTncian

| Field | Data Type | Size |
|---|---|---|
| AssetID | Number | LongInt 4 |
| MaintenancePerformedBy | Text | 255 |
| Company | Text | 50 |

Table: Models

| Field | Data Type | Size |
|---|---|---|
| Model | Text | 50 |

Table: Purpose

| Field | Data Type | Size |
|---|---|---|
| Purpose | Text | 255 |

Table: StaffInCharge

| Field | Data Type | Size |
|---|---|---|
| ID | Autonumber | LongInt 4 |
| Staffname | Text | 50 |

Table: Staffmembers

| Field | Data Type | Size |
|---|---|---|
| EmployeeID | Lookup | LongInt 4 |
| FirstName | Text | 50 |
| LastNamè | Text | 50 |
| Title | Text | 50 |
| Location | Text | 50 |

### 3.5.2 System Specification

Managers of the system:

The database shall be managed by well trained staff members or staff members with relevant computer literacy knowledge.

Power users of the database are as follows;

- Managers and staff members responsible for inventory control
- Procurement Officers
- Other designated staff members as approved by management

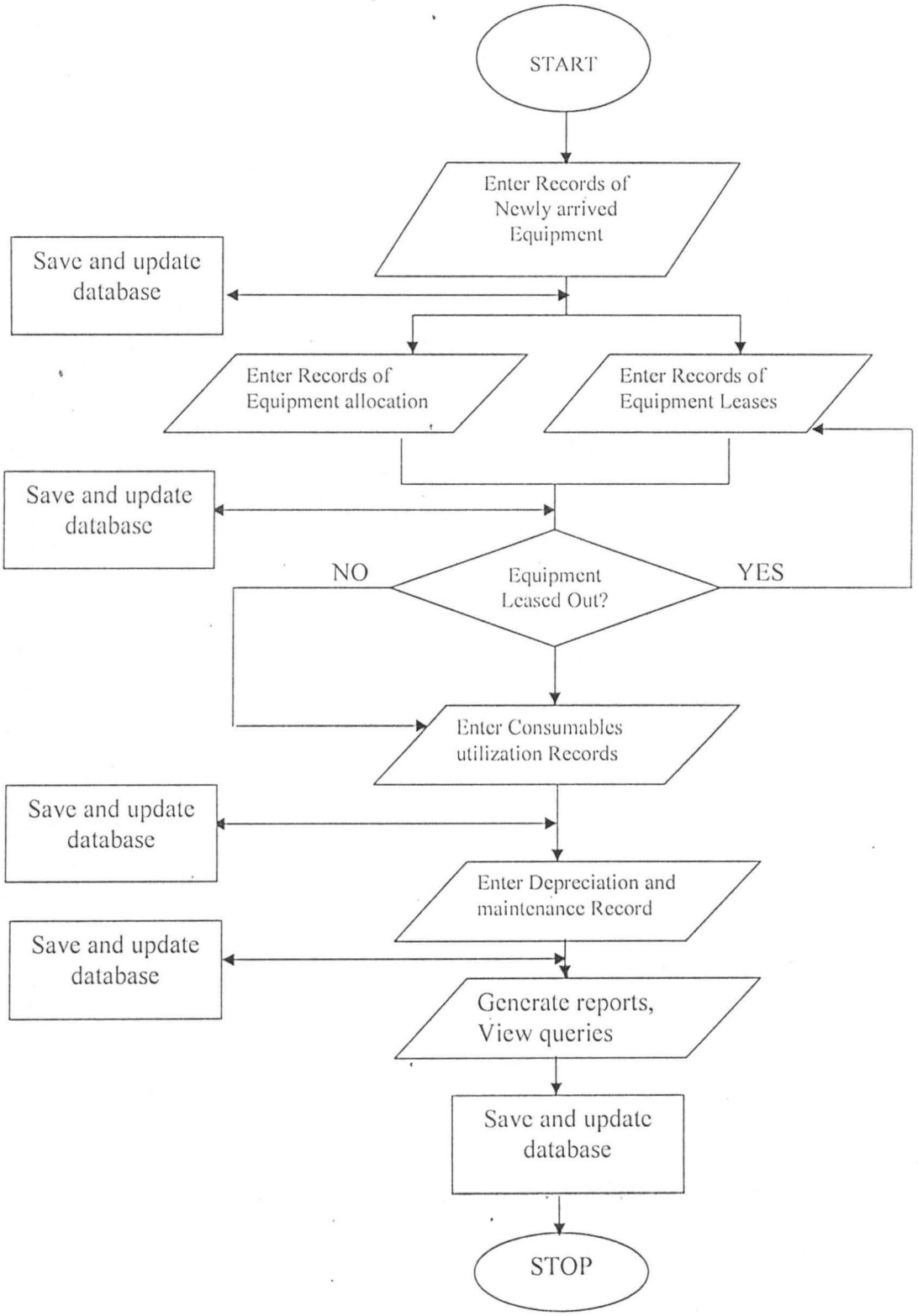
Minimum System Requirement: Pentium 3, 128MB RAM, 40GB Hard

Disk Space, windows 2000 Pro, Microsoft Office 2000

Valid Antivirus and antispyware software installed.

## 3.6 FLOW CHART

The vital stages involved in the functioning of the database are represented below (basic stages such as recording data n single column tables are not shown):



# CHAPTER FOUR

# PROGRAM OUTPUT AND IMPLEMENTATION

## 4.1 GENERAL STRUCTURE OF THE PROJECT

The database contains a total of twenty-two tables, six queries, nineteen forms and eighth reports as shown in the Table1 below

| Type of Table | Quantity |
|---|---|
| Master | 16 |
| Transaction Tables | 8 |
| **Total** | **24** |

| SNo | Table | Type | Purpose | No. Of Fields |
|---|---|---|---|---|
| 1 | ConsummableMaster | Master | Tracking of consumable | 5 |
| 2 | ConsummablesLists | Single Column Master | Tracking of consumable | 1 |
| 3 | ConsummablesXX | Transaction | Tracking of consumable | 8 |
| 4 | Departments | Single Column Master | Look up | 2 |
| 5 | Depreciation | Transaction | Equipment & Inventory Management | 1 |
| 6 | EquipmentCat | Single Column Master | Look up | 2 |
| 7 | EquipmentCodes | Single Column Master | Look up | 1 |

| | | | | |
|---|---|---|---|---|
| 8 | EquipmentRecords | Transaction | Equipment & Inventory Management | 17 |
| 9 | InventoryNumbers | Single Column Master | Look up | 2 |
| 10 | LeaseRecord | Transaction | Equipment Tracking | 8 |
| 11 | LeaseRecordMM | Master | Equipment Tracking | 2 |
| 12 | Location | Single Column Master | Look up | 1 |
| 13 | Make | Single Column Master | Look up | 1 |
| 14 | MeasurementUnits | Single Column Master | Look up | 1 |
| 15 | MntnceDate&Cost | Transaction | Equipment & Inventory Management | 3 |
| 16 | MntnceDscrptn | Transaction | Equipment & Inventory Management | 4 |
| 17 | Maintenance Technician | Transaction | Equipment & Inventory Management | 1 |
| 18 | Models | Single Column Master | Look up | 1 |
| 19 | Purpose | Single Column Master | Look up | 1 |
| 20 | StaffInCharge | Single Column Master | Look up | 1 |
| 21 | Staffmembers | Single Column Master | Look up | 1 |

| | | | | |
|---|---|---|---|---|
| 22 | Status | Single Column Master | Look up | 1 |
| 23 | Vendors | Transaction | Equipment & Inventory Management | 12 |
| 24 | Vendors List | Single Column Master | Equipment & Inventory Management | 1 |

## 4.2 CREATION OF TABLES

The database comprises of twenty tables. In order to achieve a fully normalized database and avoid storing multiple copies of some fields to various tables, single column of fully normalized table are created while other tables have look-up fields pointing to such items.

Table1: Staffmembers

| EmployeeID | FirstName | LastName |
|---|---|---|
| 3 | David | Owolabi |
| 2 | Fati | Garba |

Table2: Status

| Status ID | Status |
|---|---|
| 1 | In Service |
| 2 | Inactive |
| 3 | Sold |

Table3: Purpose

| Purpose |
|---|
| Mission |
| Projection |

Table4: Model

| |
|---|
| LJ 2000 |
| A2 |
| A5 |
| LJ 1000 |
| LJ 1300 |

Table5: Make

| Make |
|---|
| BOXLITE |
| COMPAQ |
| DELL |
| FUJITSU |

Table6: Status

| Location |
|---|
| Abuja |
| Adamawa |
| Anambara |

Table7: Status

| Department |
|---|
| HIV/AIDS |
| Poverty Alleviation |
| Energy & Environment |
| RC |
| ICT |
| Finance |
| HR |
| Procurement |
| Travels & Protocols |

Table8: Consumables

| Item |
|---|
| Paper-A2 |
| Paper-A5 |
| Punch-M |
| Punch-S |
| Toner-B |
| Toner-C |
| Toner-M |
| Toner-Y |

Table9: EquipmentCategory

| ID | EquipmentCategory |
|---|---|
| 2 | Desktop |
| 3 | Printer |
| 4 | Laptop |
| 5 | Copier |
| 6 | Digital Sender |

Table10: EquipmentCode

| EquipmentCode |
|---|
| DEL01 |
| DEL03 |
| SNY03 |
| SOY01 |
| SOY02 |

Table11: Measurement

| Measurement |
|---|
| Bottles |
| Boxes |
| Dozens |
| Packs |

Table 12: StaffInCharge

| Staffname |
|---|
| Adamu Haruna |
| Suleiman Jarma |
| James Marcus |

Table13: Consumables *(Transaction Table)*

| ID | Model | Item | Measurement | Qty Requested | Qty Received | Unit Cost |
|---|---|---|---|---|---|---|
| 1 | LJ 1000 | Toner-B | Pcs | 3 | 1 | 12000 |
| 2 | LJ 1300 | Paper | Reams | 4 | 2 | 500 |
| 3 | LJ 1000 | Toner-B | Pcs | 2 | 1 | 12000 |
| 4 | LJ 1000 | Toner-B | Pcs | 2 | 2 | 12000 |

Table14: Consumables *(Master Table)*

| Requisition# | Requestor | Supplier | Description | RequisitionDate |
|---|---|---|---|---|
| 1 | Waziri, Adio | Adamu Haruna | For Office Use | 1/12/2003 |
| 3 | Fati, Garba | | | 1/5/2007 |

Table15: Equipment Records

| ID | Code | Employee ID | AssetCat | Status | Dept | Vendor | DepreciationMethod |
|---|---|---|---|---|---|---|---|
| 1 | SOY 01 | Osibo, Oladipo | Desktop | Sold | RC | Task Systems | SL |
| 2 | TOS 02 | Adio, Waziri | Desktop | In Service | RC | Micro Prod | SL |
| 3 | SNY03 | Osibo, Oladipo | Printer | In Service | RC | Sharp Sys | SL |

Equipment Records *continued...*

| Make | Model | Model No | SerialNo | DateAcquired | DateDisposed | DepreciationMethod |
|---|---|---|---|---|---|---|
| | | | 12344111 | | | SL |
| | | DPC466T | 6465531 | 2/6/2005 | | SL |
| | | 560C | 4546324 | 1/1/2005 | | SL |

Equipment Records *continued...*

| Comments | Description | Lookup to Table2 |
|---|---|---|
| | | 2 |

Table16: LeaseRecord Transaction

| Equipment Code | Collected by | Unit |
|---|---|---|
| DEL01 | Adio, Waziri | Communication & Business Administration |
| DEL03 | Adio, Waziri | Communication & Business Administration |
| SNY03 | Osibo, Oladipo | Energy & Environment |
| SNY03 | Garba, Fati | Poverty Alleviation |

LeaseRecord Transaction continued...

| DateOut | DateRtrnd | Staff InCharge | Lookup to Purpose | Lookup To Location Taken |
|---|---|---|---|---|
| 10/22/2006 | Not Returned | Adamu Haruna | Mission | Abuja |
| 12/28/2006 | Not Returned | Adamu Haruna | Mission | Adamawa |
| 12/28/2006 | Not Returned | James Marcus | Projection | Bauchi |
| 12/28/2006 | Not Returned | Suleiman Jarma | Mission | Anambara |
| 12/28/2006 | Not Returned | James Marcus | Mission | Bauchi |
| 12/28/2006 | Not Returned | Adamu Haruna | Mission | Anambara |

Table17: LeaseRecord Master

| Equipment | Collected by |
|---|---|
| 1 | Adio, Waziri |

Table18: Maintenance Details

| Maintenance Date | Maintenance Cost | Maintenance Description | Company | Performed By |
|---|---|---|---|---|
| 1/1/2005 | 100 | Annual Maintenance | Microproducts | Maduka Ogbonna |
| 2/2/2005 | 125 | Unexpected Repairs | Task Systems | Audu Wapa |

Table19: Depreciation

| Depreciation ID | Asset ID | Depreciation Date | Depreciation Amount |
|---|---|---|---|
| 1 | 1 | 1/31/2005 | 40.00 |
| 2 | 1 | 2/28/2002 | 40.00 |
| 3 | 1 | 3/31/2002 | 40.00 |

Table20: Vendors Details

| Vendor Name | Contact First Name | Contact Last Name | Address |
|---|---|---|---|
| Task Systems | Susan | Burk | |
| Micro Products | Billie Jo | Murray | 765 Oxford Rd |
| Synetics | Sharon | Salavaria | 3400 - 8th Avenue Suite 210 |
| Broadband | Adina | Hagege | Order Processing Dept.<br>2100 Paul Revere Blvd. |
| Sharp Systems | Jack | Creacey | 800 Main Street |

Vendors Details continued...

| City | State | Country | Phone Number |
|---|---|---|---|
| New Orleans | LA | USA | (812) 555-0122 |
| Ann Arbor | MI | USA | (613) 555-0135 |
| Bend | OR | USA | (403) 555-0131 |
| Boston | MA | USA | (717) 555-0167 |
| Cairo | IL | USA | (552) 555-0163 |

Table21: Vendors List

| VendorName |
|---|
| Broadband |
| Micro Products |
| Sharp Systems |
| Synetics |

## 4.3 CREATIONS OF QUERIES

The Relational Database Management System contains a total of five queries, namely;

I. Asset management query; created from EquipmentRecords, InventoryNumbers and Maintenance table.

Asset Management Query

| SerialNumber | ModelNumber | Model | Make | VendorID | Department ID |
|---|---|---|---|---|---|
| 12344111 | | | | Task Systems | RC |
| 12344111 | | | | Task Systems | RC |

*Asset Management Query continued....*

| AssetCategory ID | EmployeeID | AssetCode | AssetID | InventoryNumber |
|---|---|---|---|---|
| Desktop | Oba, Oladipo | SOY01 | 1 | PTR-2001-121 |
| Desktop | Oba, Oladipo | SOY01 | 1 | PTR-2001-121 |

Asset Management Query continued....

| ID | Lookup to Table2 | DateAcquired | DateDisposed | StatusID |
|---|---|---|---|---|
| 2 | 2 | | | Sold |
| 2 | 2 | | | Sold |

Asset Management Query continued....

| Depreciation Method | Comments | Description | MaintenanceDescription |
|---|---|---|---|
| SL | | | Annual Maintenance |
| SL | | | Unexpected Repair |

II. Consumables Record Query created from Consumables Transactions table

| Item | SumOfQty Received |
|---|---|
| Paper | 2 |
| Paper-A2 | 2 |
| Toner-B | 4 |
| Toner-C | 1 |

III. Employees query created from Staffmembers and Location tables

| EmployeeID | FirstName | LastName | Title | Location |
|---|---|---|---|---|
| 3 | David | Owolabi | Programme Associate | Abuja |
| 2 | Fati | Garba | Programme Associate | Adamawa |

IV. Lease Record Query created from LeaseRecord table

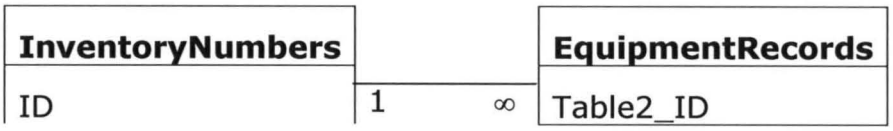
| EquipmentCode | Collected by |
|---|---|
| DEL01 | Adio, Waziri |
| SNY03 | Osibo, Oladipo |
| SNY03 | Garba, Fati |

V. Maintenance Query created from Maintenance Date&Cost, MaintenanceDescription and MaintenanceTechnician tables

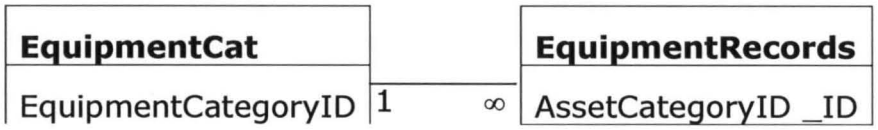
| Lookup to MntnceDscrptn | Asset ID | Maintenance Date | Maintenance Description | Maintenance Performed By | Maintenance Cost |
|---|---|---|---|---|---|
| 1, Annual Maintenance | 1 | 01-Jan-05 | Annual Maintenance | Technician | 100 |
| 2, Unexpected Repair | 1 | 02-Feb-05 | Unexpected Repair | Technician | 125 |

## 4.4 CREATION OF RELATIONSHIP

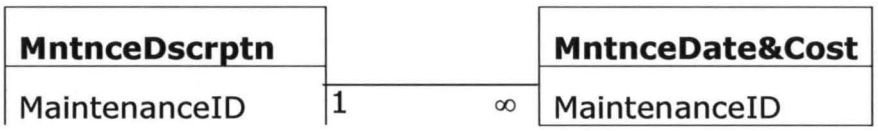
The database contains twenty-two relationships which include twenty one-to-many and two intermediate relationships.




Relationship Type: One-To-Many



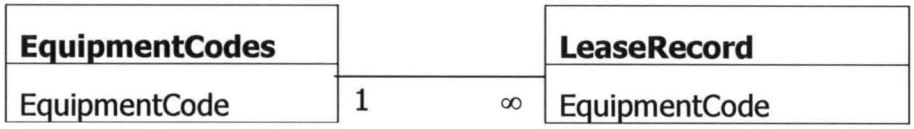

Relationship Type: One-To-Many




Relationship Type: One-To-Many


Relationship Type: One-To-Many


Relationship Type: One-To-Many



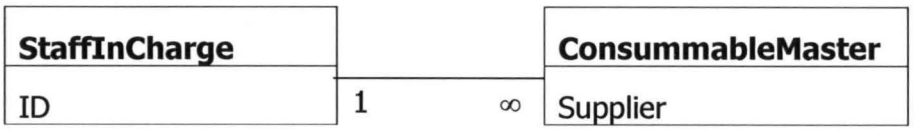

Relationship Type: One-To-Many


Relationship Type: One-To-Many

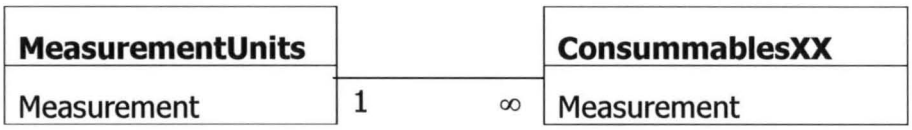

Relationship Type: One-To-Many


Relationship Type: One-To-Many


Relationship Type: One-To-Many




Relationship Type: One-To-Many




Relationship Type: One-To-Many


Relationship Type: Indeterminate


Relationship Type: Indeterminate


Relationship Type: One-To-Many


Relationship Type: One-To-Many


Relationship Type: One-To-Many


Relationship Type: One-To-Many

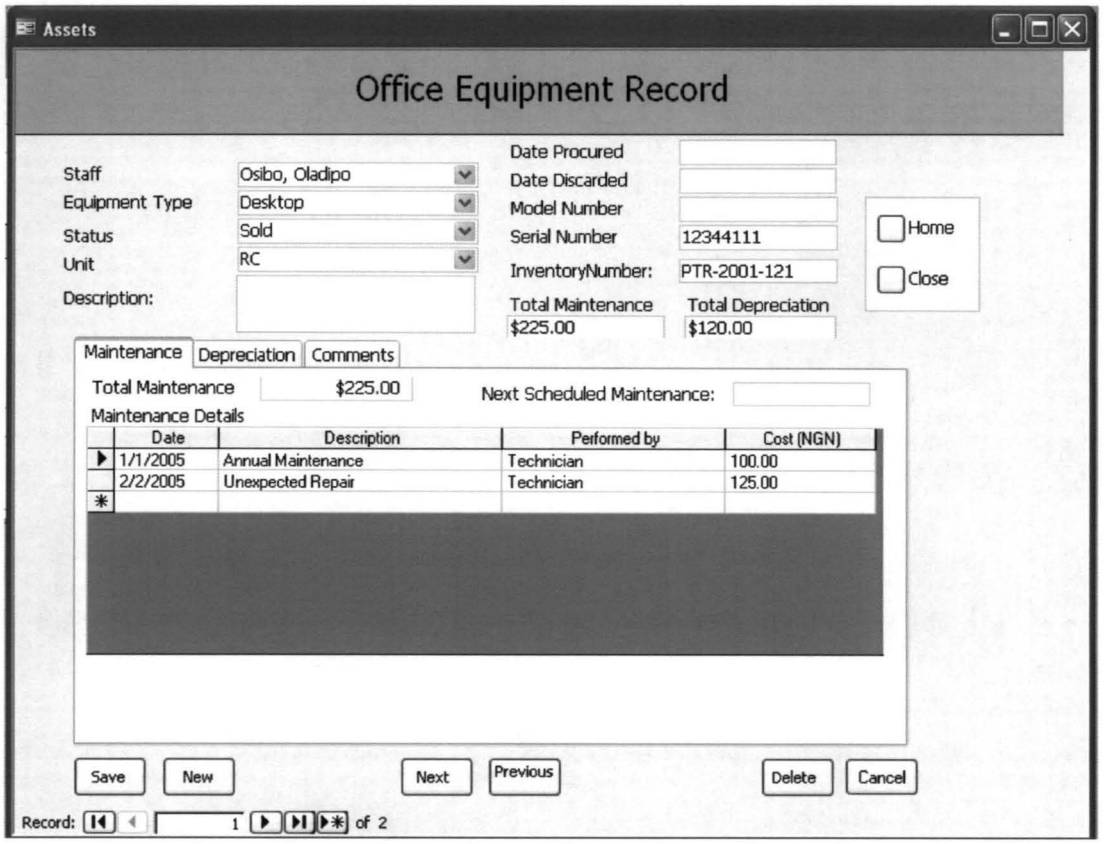

Relationship Type: One-To-Many


Relationship Type: One-To-Many

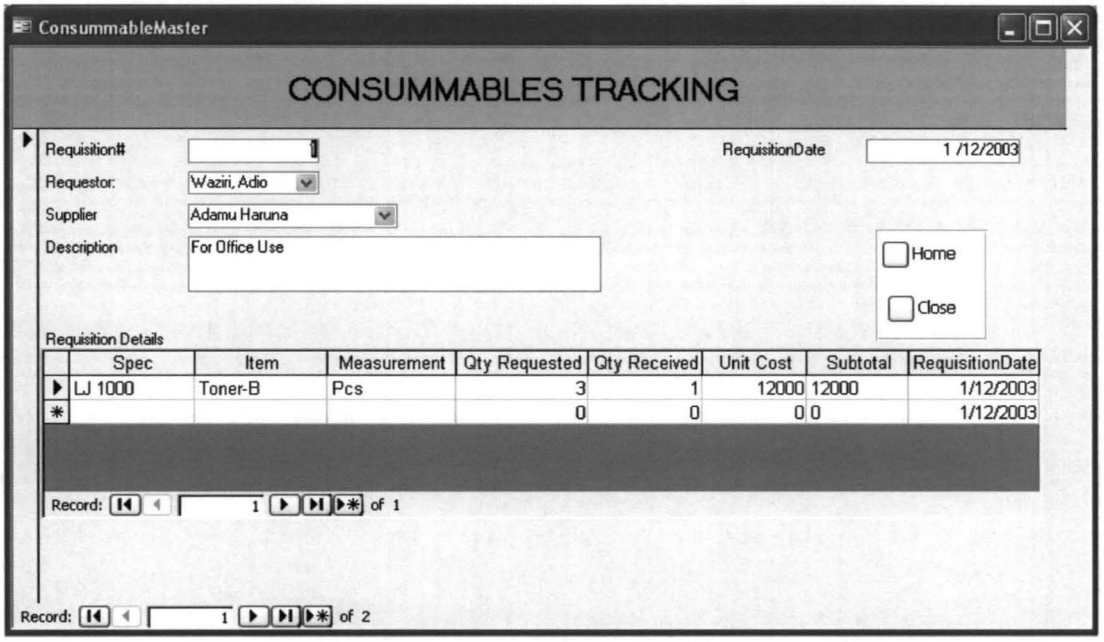

Relationship Type: One-To-Many


Relationship Type: One-To-Many

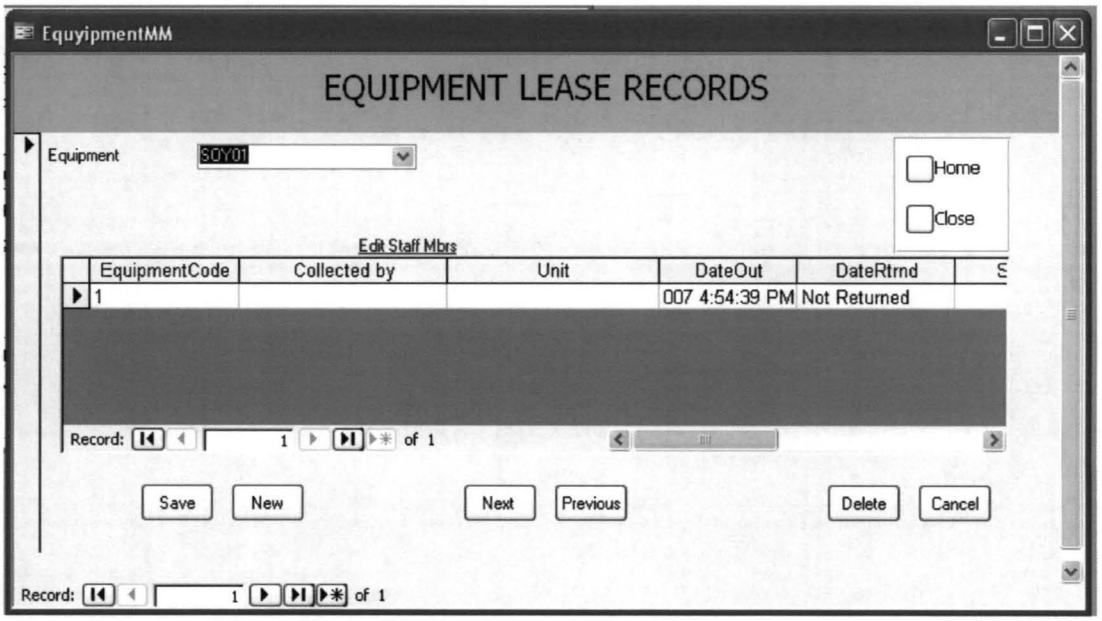
## 4.5 CREATION OF FORMS AND REPORTS



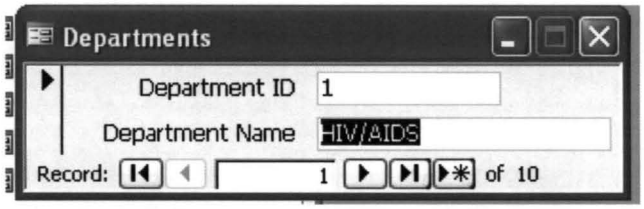

Assets Form for Entering New Equipment Records



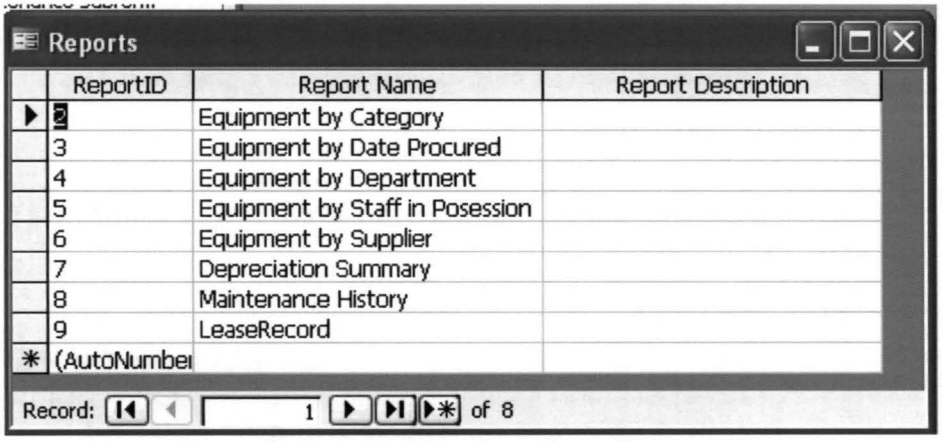

Form for Tracking Consumables Utilization



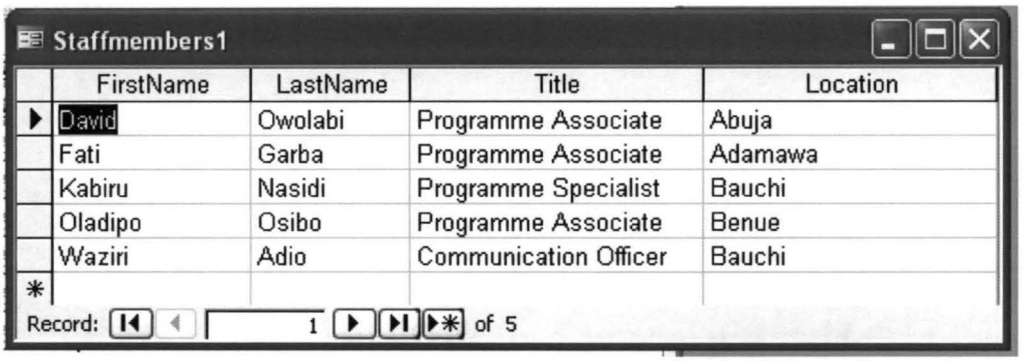

Form for Equipment Tracking Records




Form for Department Record

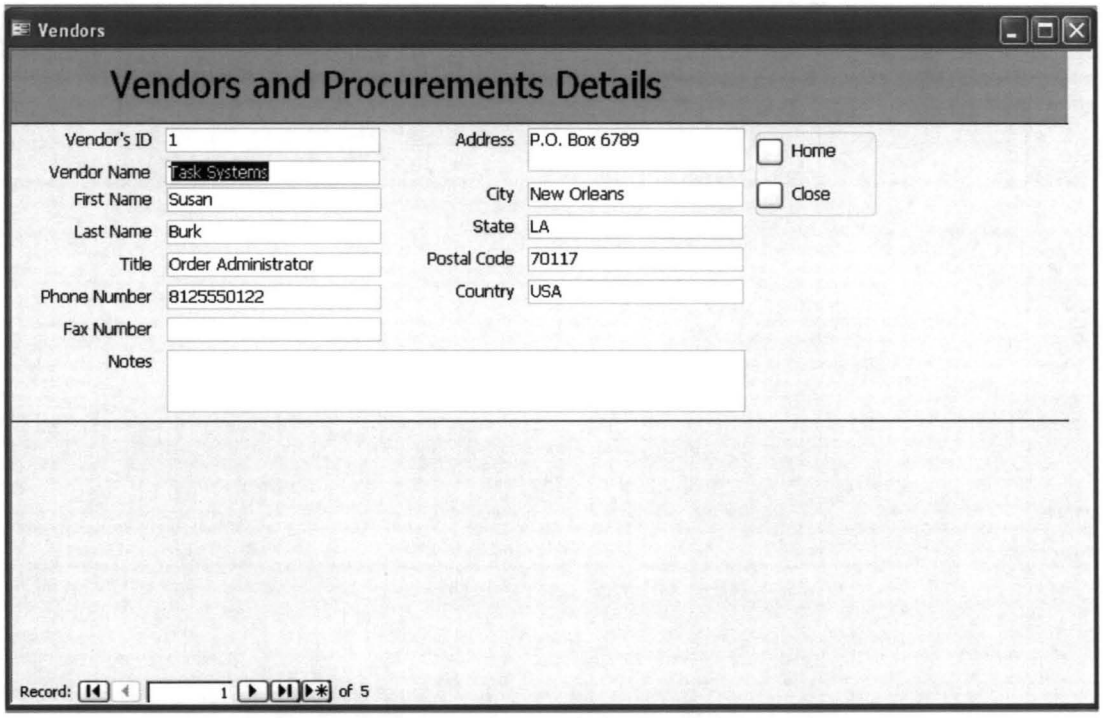



Reports Navigation form

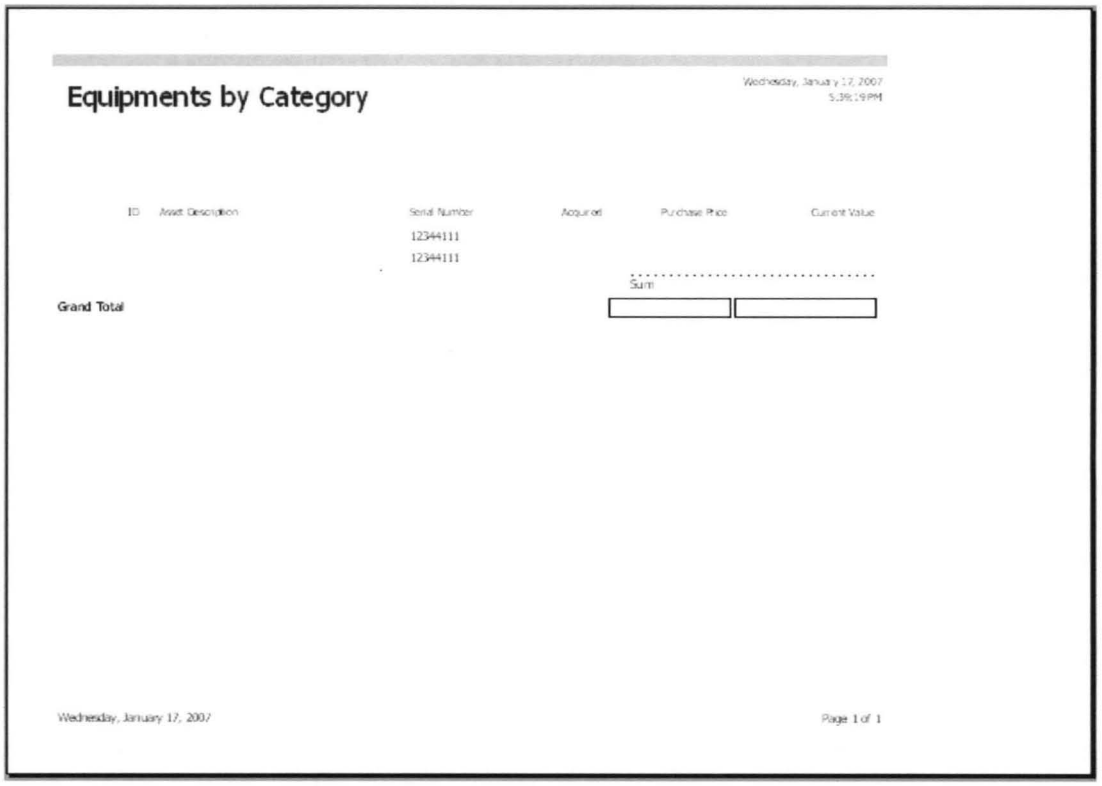



Form for Staff Members Record


Staff Status record Entry Form




Vendors and Procurement details Entry Form



Equipments by Category

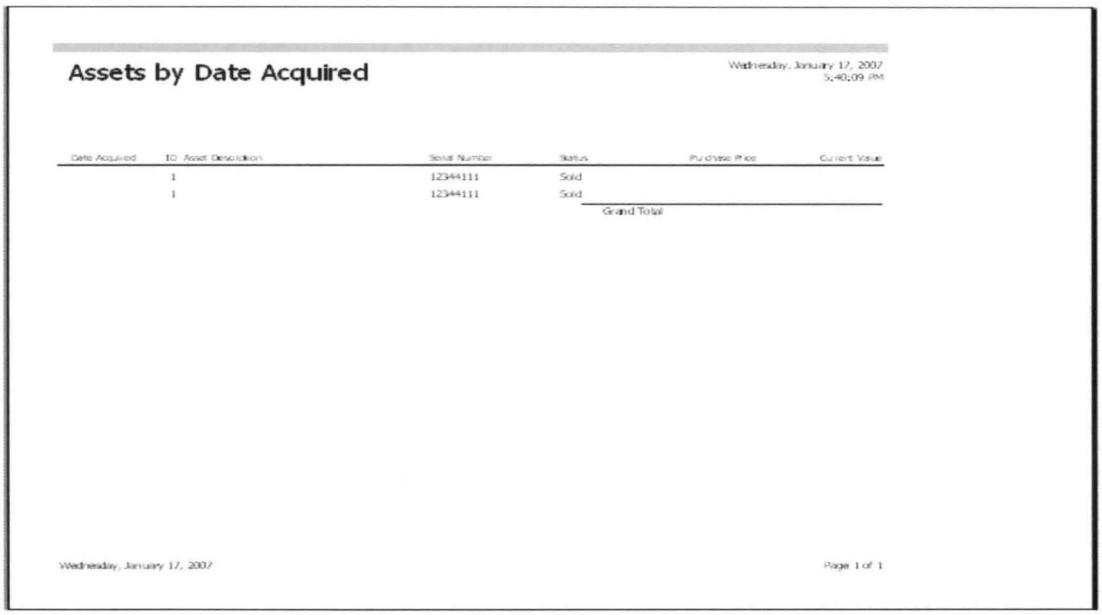
Wednesday, January 17, 2007
5:39:19 PM

| ID | Asset Description | Serial Number | Acquired | Purchase Price | Current Value |
|---|---|---|---|---|---|
| | | 12344111 | | | |
| | | 12344111 | | | |
| | | | | Sum | |
| Grand Total | | | | | |

Wednesday, January 17, 2007

Page 1 of 1

Report by Equipment Category



Assets by Date Acquired

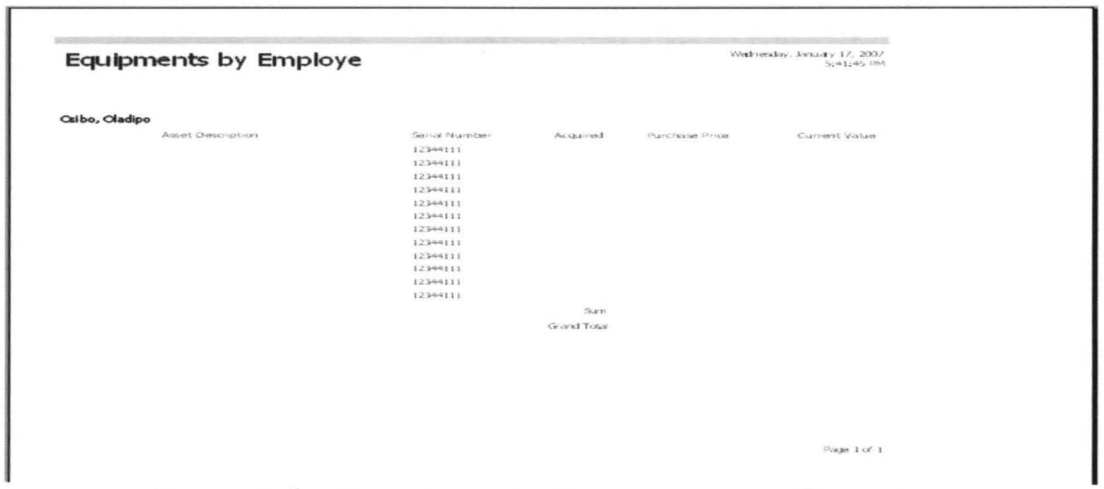
Wednesday, January 17, 2007
5:40:09 PM

| Date Acquired | ID | Asset Description | Serial Number | Status | Purchase Price | Current Value |
|---|---|---|---|---|---|---|
| | 1 | | 12344111 | Sold | | |
| | 1 | | 12344111 | Sold | | |
| | | | | Grand Total | | |

Wednesday, January 17, 2007

Page 1 of 1

Report by Date Acquired



**Equipments by Employe**

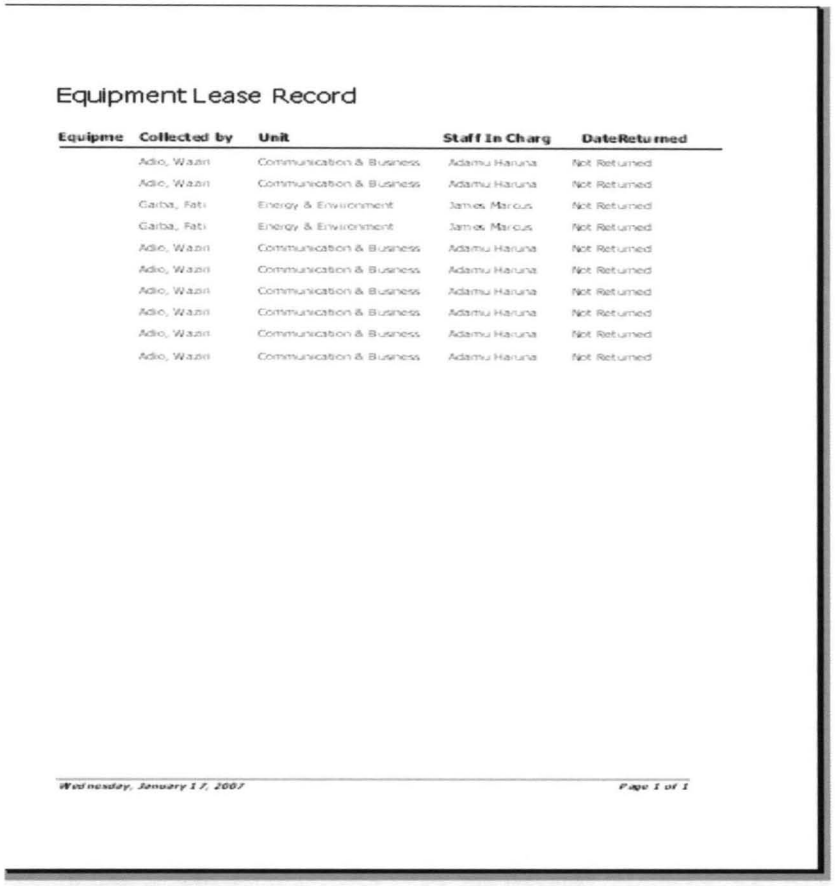
Wednesday, January 17, 2007
5:41:45 PM

**Ozibo, Oladipo**

| Asset Description | Serial Number | Acquired | Purchase Price | Current Value |
|---|---|---|---|---|
| | 12344111 | | | |
| | 12344111 | | | |
| | 12344111 | | | |
| | 12344111 | | | |
| | 12344111 | | | |
| | 12344111 | | | |
| | 12344111 | | | |
| | 12344111 | | | |
| | 12344111 | | | |
| | 12344111 | | | |
| | 12344111 | | | |
| | 12344111 | | | |
| | | Sum | | |
| | | Grand Total | | |

Page 1 of 1

Report for Tracking in Equipments Allocation



Equipment Lease Record

| Equipme | Collected by | Unit | Staff In Charg | DateReturned |
|---|---|---|---|---|
| | Adio, Wazir | Communication & Business | Adamu Haruna | Not Returned |
| | Adio, Wazir | Communication & Business | Adamu Haruna | Not Returned |
| | Garba, Fati | Energy & Environment | James Marcus | Not Returned |
| | Garba, Fati | Energy & Environment | James Marcus | Not Returned |
| | Adio, Wazir | Communication & Business | Adamu Haruna | Not Returned |
| | Adio, Wazir | Communication & Business | Adamu Haruna | Not Returned |
| | Adio, Wazir | Communication & Business | Adamu Haruna | Not Returned |
| | Adio, Wazir | Communication & Business | Adamu Haruna | Not Returned |
| | Adio, Wazir | Communication & Business | Adamu Haruna | Not Returned |
| | Adio, Wazir | Communication & Business | Adamu Haruna | Not Returned |

*Wednesday, January 17, 2007* *Page 1 of 1*

Report for Tracking in Equipments Leases

# CHAPTER FIVE

## 5.1 PROGRAM DOCUMENTATION

The new system has to be documented for easy usage by operators and programmers/analyst. It is often important that every program be fully documented which serves as operational manual for the system user(s).The documentation of the project consists of the following:

**Project Name:** Relational Database management System for Office Equipment Management and Consumables

**Database Designer/Programmer**: Agbo, John Paul, Computer Science Department, Post Graduate School, 2004/2005 PGD Session, Federal University of Technology, Minna, Niger State

**Database Type**: Microsoft Access Database with Visual End

**Client**: United Nations Development Programme, UN House, basic front Plot 617/8 Abuja

**Duration:** Started 18th, December, 2006 Ended 12th, January, 2007

**Components:** Twenty-two tables, six queries, nineteen forms and eighth reports

**Minimum System Requirement**: Pentium 3, 128MB RAM, 40GB Hard Disk Space, CD/R windows 2000 Pro, Microsoft Office 2000, Valid Antivirus and antispyware software installed.

### 5.1.1 Installation and User Guide

**Installation:** Create a new folder, preferably in a none-system partition called EQPMNT-MGMT (i.e. C:\ EQPMNT-MGMT), insert installation CD, Open My Computer, Copy entire content of CD into C:\ EQPMNT-MGMT.

Content of CD are Eqpmnt-Mgmt.mdb and Documentation.pdf. For further help on how to use the database, read the documentation file.

**Accessing the Database Program:**

For the first time, open the EQPMNT-MGMT folder (location C:\\ EQPMNT-MGMT), right click the Eqpmnt-Mgmt.mdb and chose "Send to", "Desktop (create shortcut)".

Close all windows and go to desktop; right click the shortcut ("shortcut to EQPMNT-MGMT ") and rename it EQPMNT-MGMT .Finally double click the shortcut to access the database application.

This leads to the home page form which contains two panels; Forms and Reports;

- Click the Staff members form to enter staff records
- Click Assets form to enter inventory records of equipment
- Click Leases form to enter lease record for equipment tracking

- Click report form to select a report to view
- You may also view reports on the report pane f the home page

## 5.2 TESTING AND DEBUGGING

The Relational Database program has been tested in order to see wether it runs or not and to see how effective it will work. The errors in the program have been debugged. In testing the program some data are input into the system and the system processed it and gives out the result which is accurate, because the same data are being processed manually and some output is gotten. This means the program is error free and the program will perform what is expected of it.

## 5.3 MAINTENANCE OF NEW SYSTEM

**Backup**: Backup is the process of saving an updated copy of the database in a chosen location. Storage media could be CDs, external hard disks or tapes.

Backup methods used would depend on the frequency of modification to the file. Available approaches involve

- Daily backup
- Weekly backup
- Monthly backup

**Constant Update of Operating System and Office Suite:** The operating system and Microsoft Office suite installed on computer should be constantly updated to avoid bugs and malicious software from corrupting the database and installed software.

## 5.4 CONCLUSIONS

The implementation of an RDMS application for management of office equipment will highly improve the quality of data access, management and distribution with respect to office equipment inventory, equipment tracking and relevant information retrieval. Time will be saved and the man hour gained will be channeled into other areas of work. It will also serve as a foundational implementation for future improvement and expansion.