

MANAGEMENT SYSTEM SOFTWARE FOR EFFECTIVE USE AND SALE OF PHARMATEUTICAL DRUGS IN RURAL GHANA.

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ABSTRACT

The study was undertaken to develop affordable, simple and efficient management system software that would enable all the three levels of management, to efficiently dispense and use pharmaceutical drugs in rural Ghana. The tools that were used for designing the software include Microsoft Access which was used in the creation of database, Object database compliant ODBC. Visual basic.6, which was used in designing a graphical user interface and the coding process respectively. This allowed users to interact with the system effectively. At the various stages a unique system was designed to generate appropriate inventories, reports, daily transactions, manufacturing and expiring dates and drug prescription..

A comprehensive database system was developed to store all these transactions and to enable easy accessibility and reference to stored data and information with a click of a button. This will maximize the efficient dispersion and use of the pharmaceutical drugs in time and the sharing of information much easier.

KEY WORDS: *database, management system software, Microsoft access, Object Database Compliant, graphic user interface,*

1.0 INTRODUCTION

Processing a bulk of data in an organization is an administrative process. However, these day to day activities create a big challenge to most organizations especially in rural Ghana. The existing system at JUCAD pharmacy and dispensary located in a rural settlement was established four years ago. Since then, the system has been rendered ineffective due to the increasing demand of the system by management and client. The study was therefore aimed at analyzing, designing and implementing a new system which will make the work at various levels of management at the pharmacy and the dispensary much easier and effective.

A management system is a set of interacting or interrelated elements that are joined together to achieve a common goal. Each component has its own goals, but is put together so that the individual goals and the common goals of the system are harmonized. Technology enables resources to develop more flexible structures that can respond quickly to the dynamics of the fast changing market scenario. Technology is also viewed as an instrument of cost reduction and effective communication with people and institutions. However, the use of both system software and Technology in rural Africa is a challenge. For instance JUCAD pharmacy still uses the old system of record keeping by manually keeping data in files. The supervisors at the end of the day audits and store the data in cabinets. Only few computer application programs are used. This method of data collection is cumbersome and time consuming. Hence a new complete system with the latest technology will be deployed to solve this problem.

Management system will help coordinate all these activities at JUCAD pharmacy and dispensary and

treat it as a unit at all the levels of management.

The aim of this project is to develop an affordable, simple and an efficient management system that would enable all the three levels of management, using MIS as a tool, to manage the operational level, the tactical level and the strategic level. At the various stages a unique system was designed to generate appropriate inventories, reports, daily transactions, and drug prescription.

1.1 BACKGROUND

JUCAD pharmacy, the largest and the most famous and well patronized pharmacy and dispensary shop in and around Kasoa was established ten years ago with a working staff of two. It now has a working staff of twelve, with an additional one visiting doctor and two pharmacists. As a service provider, it is well positioned at the heart of Kasoa opposite the Kasoa old market on the Kasoa-Winneba road to provide health care to residence and visitors alike.

In view of this expansion, it has become necessary for the company to use more effective way of monitoring and evaluating their staff and servicing customers alike. This resulted in management, four years ago, to employ the services of a software developer to develop a system for their daily transactions and data capturing mechanism. However, this became ineffective as the system requirement expanded beyond the

scope of the existing software.

JUCAD pharmacy provides the following services:

- 24 hour drug dispensary
- Sale of common drugs.
- Sale of prescribe drugs.
- Sale of beverages.

2.0 METHODOLOGY

The following data collection methods were employed:

- Observation
- Interview/Interaction with management and staff
- Use of existing system

To achieve this, the following were done:

- database were created with the entity relationship well established
- data control application were used to create an application that will be used to edit the database
- Interface between the database and the application system is created.

Here the actual coding of the new system was done. Testing was also done thoroughly to ensure efficiency and data integrity.

The last stage involves the evaluation of the study for a period to see if it is functioning well. If a problem is identified, the cycle is started all over again to solve the problem.

The tools that were used for designing include Microsoft Access which was used in the creation of database, Object database compliant (ODBC) and visual basic.6, which was used in designing a graphical user interface, and the coding process respectively. This allowed users to interact with the system effectively. As with the phase of system analysis, there was significant overlap among the various phases. In that case, the design alternative process was used. That is, It started with general ideas at the operational level and then move to more specific idea at the tactical and strategic level.

At the output level the various tables of transactions was designed for easy usage.

The system development life cycle (SDLC) is employed to achieve the proposed objectives. This includes; feasibility studies, system analysis, design and implementation.

2.1 SYSTEM ANALYSIS AND DESIGN

The systems analysis phase of the software development process for JUCAD pharmacy requires that the processes be decomposed into their component pieces for the purpose of studying how well these components parts work and interact to accomplish the overall goals of the business organization.

After systems analysis, which breaks down a system for the purpose of understanding how its various components interact, it is necessary to reassemble these components back into a complete system. The

complementary problem-solving technique (to system analysis) that reassembles a system's component pieces back to back into a complete system is known as systems design.

2.2 THE NEW SYSTEM

The new system was designed to be able to imitate the real-life functions or operation of the dispensary and the pharmacy shop after carefully studying the operations of the shop and identifying all the shortcomings. The new system is user friendly, easy to understand and use. Its' simplicity allows' all personnel with a low background in IT to use the software with little training.

The greatest advantage of the new system is that it enables easier storage and retrieval of information and generates report at any time with a click of a button.

The database management software used for the new system is the Microsoft access, development platform with tables design access. This is used to create and customize the management system for keeping records at the shop.

Benefits to be drive include;

- Ensuring of data integrity
- Providing a user friendly interface
- Handling huge data repository

Below are the database tables designed with access. These comprises;

- Various categories of drugs table
- Product table
- Sales table
- Prescription table.

With the used of visual basic.6 language all the table were link together to form the required designed using forms. These forms will capture data into the database tables. Menus are used to saves keystroke and make the system easier to use, hence interactive. Menus are a set of alternatives selections presented to a user in window. These give users the opportunity to make selection from a set of actions. Once an action is selected, another menu may be presented which depend on the previous selection. The tables are shown below.

TABLE 1: STOCK CATEGORY

FIELD NAME	DATA TYPE	DESCRIPTION	DAT A SIZE
CatID	Autonumber	category Identification	20
Descript ion	Text	Type of product	10

2.2.1 THE VARIOUS ACCESS DATABASE TABLES DESIGN

TABLE 2: SALES

FIELD NAME	DATA TYPE	DESCRIPTION SIZE	DATA
SI	Number	self identification	20
Pcode	Text	product code	20
InNo	Autonumber	input number	10
Description	Text	sales description	20
Staff	Text	Staff	50
Accid	Text	Accidentification	20
Accnam	Text	account name	50
Qty	Number	available quantity	10
VAT	Currency	value added tax	20
NHL	Currency	National health levy	10
Discount	Number	Discount	10
Price	Number	price of item	20
Total	Currency	total amount	10
Sdate	date/time	set date	20
Ptype	Text	product type	15
Sp	Text	sold product	20
PAmt	Currency	product amount	10

PTAmt	Currency	Product total amount	20
AmtPay	Currency	amount paid	20
NetAmt	Currency	net amount	20
Loc	Text	Location	50
Credit	Currency	Credit	20
Debt	Currency	Debit	20

TABLE 3: PRODUCTS

FIELD NAME	DATA TYPE	DESCRIPTION	DATA SIZE
Pcode	Text	product code	50
SuppliersID	Text	suppliers' identification	50
InNo	Autonumber	input number	20
Cat	Text	Category	20
Pnm	Text		10
Description	Text	Product description	20
Price	Currency	price of product	10
Selprice	Currency	selling price	10
Rprice	Currency	production price	10
Wprice	Currency		10

Opn	number	Operation cost	10
Qtysld	number	quantity sold	10
Qty	number	quantity remaining	10
Trqty	Number	type of quantity	20
Sdate	Date/Time	set Date	20
Status	Text	Status	10
Supplier	Text	Supplier	20
Stktype	Text	stock type	10
Tax	Text	tax on item	20
SerialNo	Text	erial number	20
Loc	Text	Location	10
Reord	number	Reorders	20
Type	Text	product type	15
Lprice	Currency	lost price	10
Um	Text	Under manufactured	10
Qtybal	number	quantity	

		remaining	20
ManDate	Date/Time	manufacturing date	20
ExpDate	Date/Time	expiring date	20

TABLE 4: PRESCRIPTIONS

FIELD NAME	DATA TYPE	DESCRIPTION	DATA SIZE
SI	Number	self-identification	20
Pcode	Text	Product code	50
Description	Text	Product Description	20
Staff	text	Staff	50
Qty	Number	Quantity	10
Price	Currency	price of product	10
Total	Currency	total amount	20
Sdate	date/time	set time	20

2.2.2 OUTPUT AND INPUT FORMS USE BY THE NEW SYSTEM

After using access to designed the require tables, these were then converted into forms for input data to be fill in.

2.2.2.1 OUTPUT DATA FORMS

The main output forms used by the new system are;

- Sales transaction report.
- Product list
- Product out of stock
- Sales summary report.
- Daily summary report
- Weekly summary report
- Monthly summary report
- Profit and loss report
- Stock report.
- Product in stock
- Prescriptions report.
- Product by Category report.

being access, destroyed, or lost by unauthorized users, who should not have access to the data. To prevent this, an interactive system must be developed like the one been developed to protect data and its related accessories.

The process of giving proper rights to the secured system is by assignment of rights and access privileges by the administrator to end users. Thus security ensures that database objects are obtained by using Microsoft access commands.

This will be shown under design;

2.2.2.2 INPUT DATA FORMS

To input data into the computer, forms are designed to capture the data on to the computer. These forms are designed to meet the need of the organization. Above is a designed forms which is easy to fill and understood. These forms layout are clear, in order to capture the necessary data, in other to satisfy the requirements and all transactions of JUCAD Pharmacy.

2.2. 3 SECURITY OF THE SYSTEM

Security in computer system are set of instruction provided in software that protect stored data from

2.2.4 SYSTEM VALIDATION

In system development, there is a mechanism call Quality Assurance; which checked processes at various stages of the development life cycle, and assures that requirements are not lost or changed during the process. It also ensures that errors are minimized.

Quality Assurance mechanism includes: validation of output from and various actives against the system's original requirement. Thus validation assures that any change made will not affect the integrity and consistency of the database.

2.2.5 THE SYSTEM WORK PROCEDURE

To obtain the outputs listed above from the inputs, the following procedures are followed. These procedures, though manual have been designed in such a way that the required outputs are obtained in a way that is as efficient as possible.

Generally, the sales department is the first point of call, where customer just walk in, approach the sales person and mention the name of the drug he or she want to buy, the sales person input the data and print out a receipt and the item issue to the customer. The same procedure is followed, if the customer holds a prescription form. However, if the customer did not exactly know what drug he want to buy, then the customer is directed to the pharmacist, who will then listen and interview the customer determine what he want to buy and issue prescription form and the cost involve, he then take it to the sales person and the procedure is followed as before.

At the close of the day the supervisor take stock by determine what is sold through the available summarized report and this help him to also determine the stock level and new orders made to the agent for supply and restock or restock from the warehouse.

Finally, the supervisor checks, through the system to see drugs that are likely to expire the next month and send report to the manager for action. This is help by the design of a prompt notice called e-prompt or pop out message which duty is to show a thirty days blinking notice with the date, this makes it easy to be seen by the supervisor.

Below are data flowcharts for the system work procedure:

2.2.6 DESIGN OF THE NEW SYSTEM

Design of the new system was focus mainly on the tasks that will enhance the implementation of a computer based solution to the problems identified in the existing system during the analysis of the existing system. The goals that the systems design phase seeks to achieve include the following:

- To provide an opportunity to review the current business process and fix any inefficiencies or flaws uncovered
- Educate the staff at JUCAD Pharmacy and Dispensary as to how the software development process occurs and incorporate them as partners in this process
- Create a realistic project scope and timelines for completion

- Provide a basis for determining the software testing requirements
- Reduce the cost and time required to implement the software application

2.2.7 APPLICATION SOFTWARE DESIGN

Design of the application was done using Microsoft access, which is an object oriented design methodology. The models used in designing this management system for JUCAD pharmacy have been listed below, with further details provided subsequently.

- Software requirement specification: A textual description of the overall responsibilities and scope of the system.
- Use case: A textual/graphical description of how the system will behave from the users' perspective
- Class diagram: A visual blueprint of the objects that will be used to construct the system.
- Flowchart: a diagram that represents the sequence of operations in a process.

2.2.8 SOFTWARE REQUIREMENT SPECIFICATION

The software requirements specification outlined here are to describe the overall responsibilities, functionality and scope of the new system being developed.

It also serves as an agreement among all the stakeholders on the responsibilities, functionality and scope of the system.

It is by no means a final document on the functionality of the system. The details here are only to ensure that all stakeholders have the same understanding of the system to be developed. It may be changed at any time of the development process if it is found out that any of the details specified here is not representative of the actual system being implemented by the JUCAD Pharmacy and Dispensary department. Below are the requirement specifications for the new system.

- i. Print all type of report
- ii. Sale drugs
- iii. Manage stock and stock levels
- iv. Issue prescription and billing
- v. Detect expiring date.

3.0 RESULTS AND DISCUSSION

The implementation phase of the system development process is the phase in which the design of the new system being developed, obtained by performing various system analysis procedures on the existing system at JUCAD Pharmacy and Dispensary.

The implementation phase involves the following:

- i. System Development
- ii. System Testing
- iii. Deployment of system
- iv. System documentation

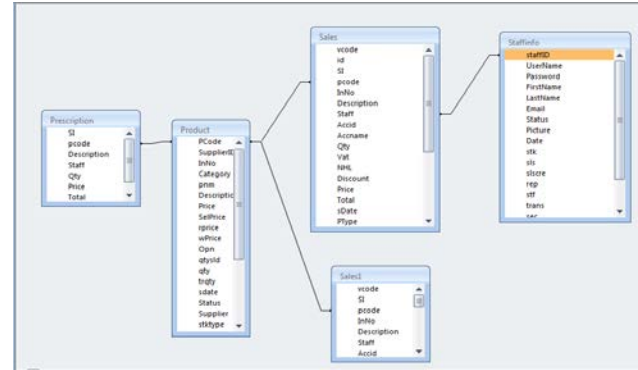
The results of various designs were display in various design diagrams and tables below.

3.1 CLASS DIAGRAM:

A class is defined as a set of objects that share the same attributes and behavior. It serves as a blueprint for objects, which hold data and procedures that are used to work with or manage the data.

A graphical representation of the classes in a system and the relationship existing among these classes is referred to as a class diagram. A class diagram helps in visualizing the attributes and operations of a class. The Database design of the new system, is an example of a class diagram.

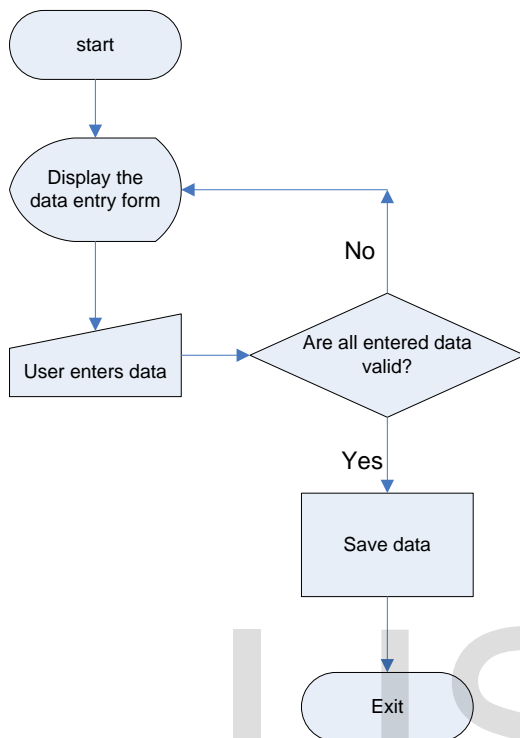
This is shown below.



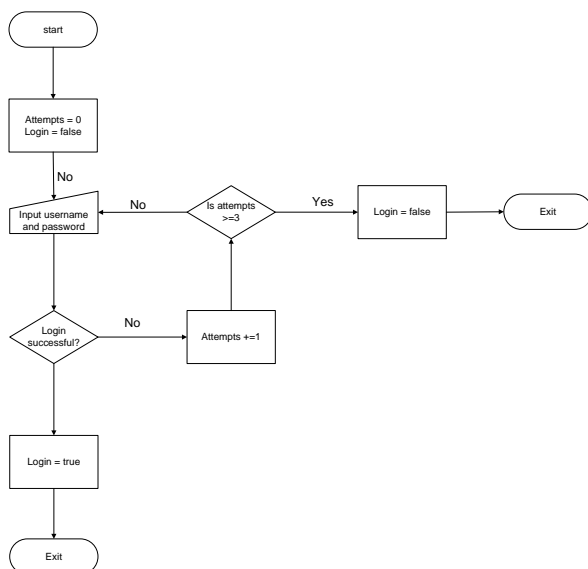
3.2 FLOWCHART:

A flowchart is used to show the stepwise procedures used in solving a problems. Many flowcharts have been employed in designing the new system. Some of the flowcharts used are specific to certain procedures in a particular class while others are used for procedures that are common to many different classes. For example, the flowchart used for saving information from the application into the database is same most of the classes. Below show's various flowcharts used during the designed phase of the new system.

Flow Chart For Saving And Updating All Items

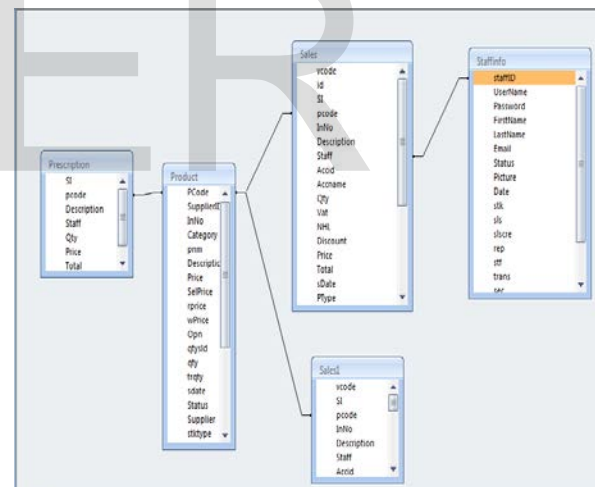


Login Flow Chart



3.3 DATABASE DESIGN

Microsoft access database management system was used as a backend to the application. It is a requirement that every database designed must be effective, reliable and maintainable. Since the system requirements serve as a guide to the course of the new system, the database was designed based on the requirements. The figure below (DATABASE DESIGN) shows the design of the database that was built as a backend to the system.



(Database design)

3.4 SYSTEM INTERFACE DESIGN

The interface design involves the design of input, output and dialogue structures that will be used by

the system users for interacting with the system.

Since this will be the part of the system that most system users will be working with, it is very important that at the design stage, the users' ideas and suggestions be solicited. This will enhance the probability of achieving an easy-to-learn and an easy-to-use interface, both of which are very important features of any system's user interface.

Here, Object database compliant (ODBC) was used to interfacing the new system.

3.5 INPUT AND OUTPUT FORMAT

The input format will consist mainly of users entering data into the system by use of the keyboard and the mouse into forms. The only input that under normal conditions would require neither keyboard nor mouse input would be the detection of expiring date where e-prompt is used.

Input is involved providing required data into forms within the software application. These data would be verified by procedures in the application before being saved into the database to be later processed and sent to the output when required.

The output to be generated from the system is made available to the users by two different means. These are:

- Form Display – form display involves the user viewing a soft copy of the requested output. Here, the user will not have the ability to create a hard copy or print of the output being viewed.
- Reporting Tool – outputs viewed using a reporting tool will also be a soft copy of the requested output, however, a feature that allows the user to print the output or export it to other formats such as a word document or a portable document format (PDF) will be available to the user. The reporting tool that will be used to achieve this is the crystal reports reporting tool.

Below are the output report generated, this include;

- Sales report forms
- Inventory report forms
- Prescription and billing report forms
- Category report forms.

This are shown below:

Prescription table:

Field Name	Data Type	Description
id	Number	
pcode	Text	
Description	Text	
Staff	Text	
Qty	Number	
Price	Currency	
Total	Currency	
sDate	Date/Time	

Field Name	Data Type	Description
code	Text	
id	Number	
SI	Number	
pcode	Text	
InNo	AutoNumber	
Description	Text	
Staff	Text	
Accid	Text	
Accname	Text	
Qty	Number	
Vat	Currency	
NHL	Currency	
Discount	Number	

Staff information table:

Product table:

Field Name	Data Type	Description
PCode	Text	
SupplierID	Text	
InNo	AutoNumber	
Category	Text	
pnm	Text	
Description	Text	
Price	Currency	
SelPrice	Currency	
rprice	Currency	
wPrice	Currency	
Qty	Number	

Field Name	Data Type	Description
staffID	AutoNumber	
UserName	Text	
Password	Text	
FirstName	Text	
LastName	Text	
Email	Text	
Status	Text	
Picture	Text	
Date	Date/Time	
stk	Text	
...	Text	

Sales table:

Opn	Number	
qtysld	Number	
qty	Number	
trqty	Number	
sdate	Date/Time	
Status	Text	
Supplier	Text	
stktype	Text	
tax	Text	
serialNo	Text	

Category of drugs table:

Field Name	Data Type	Description
CategoryID	AutoNumber	
Description	Text	

Various type of forms designed are shown below;

Login interface: This is where the user log on into the system for operation

Account:
Password:

Stock and stock levels (inventory) forms.

Inventory
First Prev Next Last Add Save Edit Delete Print Close
Item Code:
Name:
Category: Quantity:
Price:
Critical Level:
Mani: Exp. Date:

Prescription and billing form.

Prescription
Date:
Product: Price: Qty: Add

Pcode	Description	Qty	U. Price	Total
105	Amoxicillin	1	2.00	2.00
106	Amoxicillin	2	5.00	10.00
904	Testproduct	8	2.00	16.00
901	CHAMPION COM...	4	2.00	8.00
2	paracetamol	3	3.00	9.00

New Save Cancel Print 63.00

Category forms.

Category
COUGH MIXTURE
ANTIBIOTICS
LOCAL HERBS
PAIN KILLERS
BLOOB TONIC 1
BLOOD TONIC
ANTIBIOTICS LIQUID
LOOSE
Category:
Name:

Sales interface form:

Sales
Sales Type: Cash

Item Code / Description	Unit Price	Qty	Total
AMOXXY	.40	5	2.00
CHAMPION COMDOM	.10	20	2.00
EFFAC	.30	5	1.50
TARZAN	.20	2	.40
paracetamol	.01	10	.10
TANZOL	.50	5	2.50

Total: 8.50
Discount: 0
VAT@8%: 1.28
Net Total: 9.78

Examples of reports are shown below;

Stock Summary
ANTIBIOTICS

PCODE	Product Name	Description	Price	Qty
1	AMOXXY	AMOXXY	12.00	97
105	ampricillin	ampricillin	0.40	100
697	KY	KY	50.00	1000
904	Testproduct	Testproduct	20.00	2
Total				1199

ANTIMAL

PCODE	Product Name	Description	Price	Qty
902	MALAFAN	MALAFAN	5.00	500
Total				500

ANTIMALARIA

PCODE	Product Name	Description	Price	Qty
903	MALAREX	MALAREX	0.40	30
Total				30

CONDOM

PCODE	Product Name	Description	Price	Qty
715	CONDOM	CONDOM	0.80	5000
902	CHAMPION COMDOM	CHAMPION COMDOM	0.10	1000
Total				6000

DEWORMER

PCODE	Product Name	Description	Price	Qty
305	TANZOL	TANZOL	0.50	30
Total				30

PAIN KILLERS

PCODE	Product Name	Description	Price	Qty
105	Amoxicillin	Amoxicillin	0.30	200
2	paracetamol	paracetamol	0.01	100
Total				300

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JUCAD					
:					
Product by Category					
ANTIBIOTICS					
PCode	Category	Description	Location	Qty	Price
105	ANTIBIOTICS	ampicillin	Main	100	0.40
904	ANTIBIOTICS	Testproduct	Main	2	20.00
697	ANTIBIOTICS	KY		1000	50.00
1	ANTIBIOTICS	AMOXY	Main	92	0.40
				Total Qty	0

4.0 CONCLUSION

At various levels of management, data capture, data entry and input data are very essential to effective running of an organization. The main aim of this project is to design a more effective unique system to generate appropriate inventories, reports, queries, daily transactions, stock taking, tracking of regular customers and drug administration and prescription. Using various tools such as Microsoft Access, Visual basic.6 and ODBC which were essentially tools used for the designed and coding of the application

The most important part of system development is the implementation or the coding. It is the coding that would make it possible or impossible for the system to be useful. After building the system, the system will be tested. If the testing is sufficiently met the system requirement, it is then deployed for usage. The users are then trained to use the system.

Maintenance is carried out regularly until its retirements.

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