Hospital Management System

PROJECT REPORT

Dissertation Submitted in partial fulfilment of the requirements for the Degree of

MASTER OF COMPUTER APPLICATIONS

of the Bharathiar University

P-290

By

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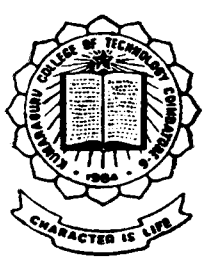

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Kumaraguru College of Technology

COIMBATORE - 641 006.

JUNE 1997

CERTIFICATE

This is to certify that the project work entitled

"HOSPITAL MANAGEMENT SYSTEM"

submitted to Kumaraguru College of Technology, Coimbatore (affiliated to Bharathiar University) in partial fulfillment of the requirements for the award of the Degree of Master of Computer Applications is a record of original work done by Mr. K. PANCHAPAKESAN , Reg.no 9438MO200 during his period of study in the Department of Computer Science and Engineering, Kumaraguru College of Technology, Coimbatore under my supervision and guidance and this project work has not formed the basis for the award of any Degree / Diploma / Associateship / Fellowship or similar title to any candidate of any University.

Professor and Head **Staff-in-charge**

submitted for University Examination held on 3 / 6 /1997

3/TUE/JUNE/1997

Internal Examiner

3/6/97

External Examiner

DECLARATION

I hearby declare that the project work entitled **Hospital Management System** at Electronics Corporation of India Limited **Hyderabad** submitted in Partial fulfilment of the requirements for the award of the Degree of **Master of Computer Application** is a report of original work done by me during my period of study in **Kumaraguru College of Technology** (Affiliated to Bharathiar University) Coimbatore - 6 under the supervision of **Mr. Dinesh**

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To whomsover IT MAY CONCERN

This is to certify that MR. K.PANCHAPAKESAN, has successfully completed his Project Work titled "HOSPITAL MANAGEMENT SYSTEM". The Project Work was done at Computer Group, ECIL.

During the course of Project Work (from the first week of Jan'97 to the 3rd week of May'97) he has extremely dedicated to his assignment, a very strong commitment and maintained utmost discipline. He is full of enthusiasm and posses an abundant initiative and deserves all encouragement.

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CERTIFICATE

This is to certify that the project work entitled "Hospital Management System" is a bonafide work done by Mr. K.Panchapakesan , a final year student of Master of Computer Applications, K.C.T. Coimbatore, for the partial fulfillment of the course of "Master of Computer Applications" under my supervision and guidance.

The Modules developed under this applications include OutPatient Administration and Equipment Maintanance on a Pentium system based on UNIX / ORACLE 7.0 platform.

S.V

(NARASIMHAM, S.V.)

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I would like to take this opportunity to thank the **faculty** of the Department of Computer Science and Engineering, KCT, Coimbatore for their guidance all through my MCA program.

Last but not the least I thank all the employees of ECIL for making my stay a very comfortable and memorable one.

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INTRODUCTION

CHAPTER - 1 PROJECT DESCRIPTION

TITLE HOSPITAL MANAGEMENT SYSTEM

The use of computers in Health Care has become an absolute necessity in the present day environment. They are used in clinical and non clinical areas, including diagnostics, surgical and non surgical treatment, information management, analysis and decision making. The administrators of the hospitals are faced with the challenge of utilizing the limited resources and provide quality care to the patients. The use of computers in hospitals for information processing and decision making helps the hospital management and the attending doctors in serving the patients better with least strain and more efficiency.

PROJECT DESCRIPTION

MASTER HEALTH (HOSPITAL MANAGEMENT SYSTEM) Package is an on-line system developed for **A CORPORATE HOSPITAL LOCATED IN HYDERABAD** under **UNIX** environment using **ORACLE(RDBMS).**

Presently, the system is being done manually and has the usual problem associated with the manual systems. Hence an integral system is considered essential to track, project and control day-to-day transactions related to patients, equipments etc, keeping these objectives in view, this package is developed.

The package is split into several modules which include

- In-patient Management
- Out-patient Management
- Diagnostic Lab reporting and Billing
- Pharmacy
- Medical Records
- Patient Billing
- Financial Accounting
- Operation Theater
- Purchase and Inventory System
- Equipment Maintenance
- Payroll, Time and Attendance System

My main emphasis was to develop modules for Out patient Management and Equipment Maintenance.

The outpatient Module is a one which has been grouped under patient care. It deals with the Patient Registration and followup, Patient Investigation Billing, Physiotherapy Billing, Duty Roaster Maintenance, Emergency Medical Attention and Bill Processing.

The processing program of this modules generates reports of the list of Outpatients, Emd and Credit, list of investigation and physiotherapy a patient undergoes, daily Credit Letter Bills, Credit Summary Bills, Individual Bills, Duty Roaster which gives the shift details.

The Equipment Maintenance is a module which has been grouped under Hospital Service. It deals with the maintenance of Supplier Master, Equipment master, Preventive Maintenance, Spare of Parts, Breakdown Maintenance and Bill Processing. The processing program of this module generate Reports on list of equipments(department wise), Equipment summary report which gives the status of every equipment, Equipment maintenance schedule, maintenance expenditure for a period and Enquiries on equipment details by equipment code, supplier details by supplier code, list of equipments supplied by a particular supplier, list of equipments purchased/installed in a period and list of equipment serial number by equipment code.

FEATURES

- Integrated, multiuser and menu driven environment.
- Modular, reliable and dependable design.
- Flexible and upgradable and easy to install.
- FoolProof protection and security features available.
- Sound back-up and recovery features.

In organisation like Hospitals, strategic decisions must be made quickly. These decision need to be based on accurate data and through analysis. The ability to analyse and exploit operation, data in a warehouse becomes a key competitive weapon. Such operational systems needs to be flexible and adaptable to change without

incurring delays or cost overruns due to application or hardware issue.

To meet these challenges, such organization need an enterprise software strategy for managing any date in any application, at any scale.

Oracle is the only open system solution that seems the demands of high-transaction OLTP systems, query processing in large scale data warehouses.

APPLICATIONS

- Corporate Hospitals
- Government Hospitals
- Hospitals of Public Sector Undertakings
- Nursing Homes
- Diagnostic Centers

1.2 ORGANISATION OVERVIEW

ECIL- The Electronics Corporation of India Limited, was incorporated in the year 1967. Over the years, the company has successfully achieved its objective of self reliance in many areas related to Electronics industry.

WINNING SOLUTIONS

ECIL, over 25 years, has blossomed into one of the few reputed Electronics Industries in India, having Computers & Information Technology, Strategic Electronics & Communication Controls, Components, Consumer Electronics and Instruments under one roof.

With a mission of self reliance in electronics backed up with a strong **R&D** team and managed by highly professional Project Management Groups, **ECIL** has always been in the forefront taking up technology challengers, keeping pace with the times and serving a variety of customers.

STRATEGIC ALLIANCES

Flexibility to meet the specific needs/requirements of a customer has always been **ECIL**'s strategy. **ECIL**'s strength lies in it ability to understand and translate those needs into total system specification that exactly match customer requirements in terms of selecting Platforms, variety of Operating Systems and suitable Application Software.

The flexibility has enabled **ECIL** to work jointly with several vendors in finding rewarding solutions to the varied and complex needs of customers, demanding integration of computers, controls and communication.

TOTAL SOLUTIONS

Today **ECIL**, with strength in system engineering and system integration, supported by experienced software development team and state-of-the-art manufacturing technologies meeting national and international standards, is in an advantageous position to offer solutions from concepts to commissioning.

PEOPLE

ECIL has a strong workforce of 7600 from reputed Universities and Institutions. The workforce has rich multi-technological experience, and are always ready to update and team up with people from different cultures and regions.

BUSINESS GROUPS

ECIL is organised into Business Groups in the following areas.

- Computers
- Strategic Electronics and communication system
- Control Systems

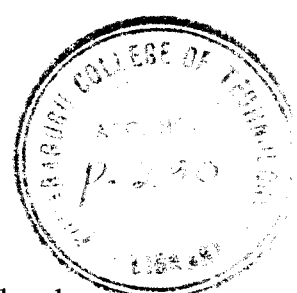
- Instruments
- Components and special products
- Industrial and consumer electronics.

ECIL, through these business groups has been able to carve out a definite image for itself in specialized areas professional Electronics.

COMPUTERS GROUP

One of the most visible and best performing groups of **ECIL** - the computer group, is involved in the manufacture of standard computer systems. This group produced a variety of products ranging from 8 to 64 bit machines. Presently the products being manufactured are a family of 32 bit Microprocessors based on Intel 80386/486 series and **LAN** based on them. Some of the important projects which are being handled are Automatic Message Switching system and **SPC**-Telex projects for **P&T**.

Crime Management System for Indian Police, the Automatic date handling system for Airforce.



PRODUCT RANGE

Product Range in computers and information technology are

HARDWARE PRODUCTS

- **LAN**s and Related hardware
- Parallel Processing System - "**ANUPAM**"

- **PC AT 286, 386SX/DX, 486 SX/DX/DX2** Based System
- Pentium Systems
- Multimedia Systems
- Network Nodes/Servers
- Work Stations

SOFTWARE PLATFORMS

- Operating Systems : **UNIX, MS-DOS WINDOWS 95, MVS, WINDOWS NT**
- DataBases : **ORACLE, INGRES, UNIFY, FOXPRO**
- Gui's : **POWER BUILDER, SQL SERVER, VISUAL BASIC, VC++, FORMS 4.5, DESIGNER 2000.**

CONSULTANCY AND APPLICATION PACKAGES

- Data communication and networking
- BASIS- Banking software
- EDP Packages for MIS, materials and Finance Management
- Computerized Directory Enquiry System
- Finger Print System
- Port Management System
- Multi Media based System
- Feasibility Studies and urn - key contracts

SERVICES

- Annual Maintenance contracts for both **ECIL** supplied and third party systems.
- Regional Maintenance Centers throughout India
- Training

CUSTOM PRODUCTS

- SPC Telex Equipment
- Message Switching Systems
- OMC Computer for E-10B Exchanges
- Automatic Message Accounting Systems
- Billing system for Telex, Telephone

ECIL registered a steady growth with its turnover of 250 crores in 92-93, 340 crores in 93-94 and in the previous year it crosses 500 crores.

STUDY OF THE EXISTING SYSTEM

CHAPTER - 2 STUDY OF THE EXISTING SYSTEM

2.1. EXISTING SYSTEM ENVIRONMENT

The existing system at one of the corporate hospital at Hyderabad is manual process.

2.2. SHORTCOMINGS OF THE EXISTING SYSTEM

The problem faced with a manual systems are

- Time consuming
- Tedious Calculations
- Slow Retrieval of Information because of inadequate means of data storage.
- Poor management as a result of disintegrated systems
- Inaccurate and Inconsistent data due to inefficient tracking of day to day transactions.

2.3. NEED FOR THE NEW SYSTEM

The number of patients visiting the hospital has been increasing over the time and a system with large scale dataware house is required to store the patients medical records and statics so that strategic decisions can be made quickly.

The need for computerisation can be discussed under the following headings

GREATER PROCESSING SPEED

Since computers process data very quickly, computer based system can help people freeing them from tedious calculations, sorting and fast retrieval of information.

BETTER ACCURACY, RELIABILITY AND IMPROVED CONSISTENCY

Computer based system improves the accuracy, reliability and consistency in calculations, comparison etc. in an organisation in time.

FASTER INFORMATION RETRIEVAL

Computerisation in an organisation will help greatly in locating and retrieving information from storage conducting complex searches about its activities.

REDUCED COSTS

Computer based system in an organisation enables the tedious tasks at lower costs within short intervals of time and thereby saves money and time.

MULTI USER FACILITY

Computer based system enables more than one user to use the system at the same time thus saving man hours.

BETTER SECURITY

In computerized organisation sensitive and important data stores will be protected by using authorization and other features.

SYSTEM ANALYSIS

CHAPTER - 3 SYSTEM ANALYSIS

3.1. REQUIREMENTS OF THE NEW SYSTEM

Based upon the requirements specification by users in various meetings and interviews and study of the problems of existing system following requirements have been identified.

1. Develop a system which can store the medical records of all the registered patients so that any query can be easily performed on any patient.

2. Develop a good subsystem to store all the investigative reports a patient undergoes so that it can be used for future references.

3. Develop a subsystem to control the purchase of inventory.

4. Develop a subsystem to maintain accurate and up-to-date bills, keep an account of daily/monthly/yearly analysis of services rendered.

5. Develop a subsystem to keep track of department wise incomes and expenditures.

6. Develop a subsystem to maintain information regarding the procurement and maintenance of spare parts and equipment.

7. Develop payroll, time and attendance system for the organisation employees.

8. Develop system with high level of securities and integrity constraints in order to have consistent and secure date.

9. Develop a system for maintaining Equipments which actually are maintained by the Bio Medical Engineering department (BME).

3.2. PROPOSED SYSTEM

To overcome the problems associated with the manual system, an integral system considered is essential. Keeping these objectives in view, this package is developed.

The new system will have the following modules :-

- In-patient management
- Outpatient management
- Diagnostic Lab reporting and billing
- Pharmacy
- Medical Reports
- Patient billing
- Financial Accounting
- Operation theater
- Purchase and Inventory System
- Equipment maintenance
- Payroll, time and Attendance system.

The details of the modules **(OUT PATIENT & EQUIPMENT MAINTENANCE)** are as follows.

OUT PATIENT MANAGEMENT

Functions

- Patient registration
- Appointments and followup
- Patient Enquiries
- Out patient Bills

Reports

- List of daily Credit letters
- List of daily Collections
- Doctor list (current day)
- Surgeon wise patient list
- Clinical details of patients
- Demographic details of patients
- Investigation report
- Physiotherapy report

EQUIPMENT MAINTENANCE

Functions

- Equipment problems monitoring
- Preventive maintenance planning
- Spare parts planning and procurement

- Equipment/spare parts history
- Costing of spare parts and maintenance.

Reports

- List of equipments
- Supplier Master list
- List of contracts
- List of equipment installed in a period
- List of contracts renewed
- List of warranty expiring
- Material cost for repairs
- List of equipments under require and period
- List of spares parts
- Equipment breakdown details.

3.3 SYSTEM ENVIRONMENT

HARDWARE

Processor	:	Pentiun 120 Mhz
Memory space	:	16 MB
Disk space	:	1 GB, 1.44 MB FDD
Printers	:	1 DMP 300 cps
Monitor	:	SVGA mono

SOFTWARE

Operating system	:	UNIX Ver 4.2

UNIX is a multi-user, multitasking operating system which serves the multi-user requirements of the new system.

RDBMS : ORACLE 7.0

FORMS 3.0

SQL-PLUS

PL-SQL

REPORTS WRITER

DATA BASE MANAGEMENT SYSTEM

The three models of a data base management system are

- Hierarchical
- Network
- Relational

Hierarchical Model

This model is like a hierarchical tree structure used to construct a hierarchy of records in the forms of nodes and branches. The data elements present in the structure has a Parent-child relationship. Closely related information in the Parent-child structure is stored together as a logical unit. A parent unit may have many child units, but a child is restricted to have only one parent.

Disadvantages :

- Not flexible
- Cannot represent many-to-many relationships

Network Model

This model is an improvement of the hierarchical model. Here multiple Parent-child relationships are used. Rapid and easy access to data is possible in this model due to multiple access paths to the data element.

Disadvantages :

- It supports one and one to many relationships only.

Relational Model

Data is organized in terms of rows and columns in a table. The position of a row or column in a table is of no importance. This model does not maintain physical connections between relations. A set of integrity rules governs the operations on the database.

Relational data base model benefits such as

- Independence of physical data storage and logical data base.
- Variable and easy access of all data
- Complete flexibility in database design

- Reduced data storage and redundancy

RDBMS DIFFER WITH DBMS

- Based on the concept of relationship.
- Speed of the operation is very fast.
- Hardware & Software required is very high.
- Minimum machine requirement is
  PC-AT 386 with 8MB RAM
- Platforms used can be any of
  Dos,Unix,Vax,Vms etc.
- Facilities & utilities offered are many.

Today the most widely accepted database model is the relational model. For the implementation of the new system ORACLE RDBMS is required.

SPECIAL FEATURES OF ORACLE

The ORACLE server provides efficient, reliable, secure data management for applications ranging from high volume on line transaction systems to query intensive data ware house application. Oracle, not only supports the complex data management, but it also provides the tools to manage the systems, flexibility to distribute the data to users effectively and efficiently.

Multi-threaded server architecture

For high performance transaction processing, the Oracle multi-threaded, multi-server architecture coordinates thousands of simultaneous user requests. Individual requests are queued and serviced by a minimum number of server processes.

Available system resources can be precisely allocated with a high degree of control, optimizing performance to the dynamic basis.

Powerful, flexible SQL language

Oracle offers number of robust SQL extensions that allows complex operations to be expressed in SQL, improving developer productivity by reducing the need for procedural code.

Shared compiled SQL

Stored procedures and database triggers are stored incompiled form, allowing them to be executed directly without recompilation or parsing, resulting in an optimum run-time performance.

Sophisticated SQL optimizer

Oracle's numerous, powerful query processing techniques are completely transparent to the end user. The Oracle optimizer dynamically determines the most efficient access paths and join methods for every query.

Productive application development

Oracle stored procedures and triggers improve application development scalability and productivity by allowing common procedures to be developed once and maintained in a central location instead of in every application.

Mirrored, Multi segment log

Oracle also supports read-only table saving time by eliminating back up and recovery of static data. Oracle includes a number of features that promote high availability in the presence of media failures or errors mirrored, multisegment log ensures that critical log data remains available if a log device fails.

Transparent Distributed Query

With Oracle, a single SQL statement can query data from multiple databases and even perform complex joins of data physically stored in different servers. Location transparency allows application to be developed without knowledge of the location of data.

Reliable Query Results

Oracle effectively supports mixed workload environment characterized by simultaneous query or update activity always provide users with consistent query results, while never imposing a performance penalty on concurrent update activity.

Superior Scalbility for transaction processing

The architecture of Oracle provides OLTP applications with scalability to support large number of users and high volumes transaction workloads.

OLTP applications take advantage of Oracle's parallel architecture by distributing tasks across multiple processors or machines, such as in a clustered environment which improves individual transaction response times and overall system through put.

On line Back up facility

Oracle online backup facility allows administrators to perform backup activities while the data base is running and without interrupting transaction processing. Oracle can use multiple processors to recover the database in parallels, seeding the on-line recovery. Roll back operations related to uncommitted transactions are performed in parallels after start up, providing earlier system availability and improved performance.

ORACLE UTILITIES

SQL : Structured Query Language is a set of commands that are used to access data within the Oracle database. The ANSI has adopted

SQL as standard language for relational database management system. The oracle server provides full SQL conformance to level 2 and full implementation of the integrity enhancement features.

BENEFITS OF SQL

- has become the database language of choice because it is flexible, powerful and easy to learn.
- is a non procedural language.
- processes sets of records rather than just one at a time.
- provides automatic navigation to the data.
- provides commands for a variety of tasks including
- querying data
- creating, updating and replacing objects
- inserting, updating and deleting rows

SQL PLUS : This is the Oracle database language which includes ANSI standard SQL command plus additional commands for accessing data in an Oracle database.

The commands are broadly classified as

- Data definition language
- Data manipulation language
- Transaction control commands

PL-SQL : This is a extension of SQL. PL-SQL contains any number of SQL structures combined with the following

- Flow of control structures
- Repetition statements
- Assignment statements

ADVANTAGES OF PL-SQL : **PL-SQL** is a completly portable, high performance transaction processing that gives you more and better ways to express problems and design database applications.

Specifically PL/SQL provides the following benefits

- Procedural capabilities
- Improved performance
- Enhanced productivity
- Portability
- Integration with the RDBMS

MAIN FEATURES OF PL/SQL:

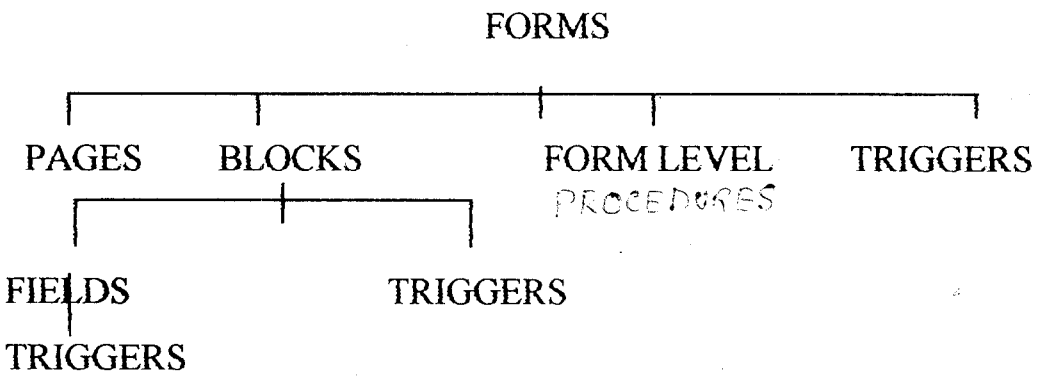
SQL DMLs are built into PL/SQL.

This allows you to insert new data, retrieve modify, delete data.

SQL FORMS : This is a general purpose tool for developing and executing forms based interactive applications. The design component of this tool is specially designed for applications developers and programmers and allows to

- define transactions that combine data from multiple tables into a single form.
- quickly create default forms using a rich set of defaults including automatic master-detail relationships.
- customize all aspects of an application definition.

SQL FORMS OBJECTS :



The SQL forms is made up of objects. The primary object or component of an SQL forms applications. This object can comprise an entire applications. It can link with other forms, groups of forms, menus, reports etc.

The other objects are

- Blocks - Describe each section or subsection of form and serves the basis of default database interaction.

- Fields - Represent columns or data entry areas and describes how the data should be displayed and validated and how an operator should interact with the data while it is entered.
- Pages - Collections of display information, such as text and graphics. All fields are displayed on a page.

- Procedure - Are as set of processing commands that can beinvoked from a trigger and can take arguments. Every form usually contains at least one block, one page, one or more fields.

COMPONENTS OF SQL FORMS:

- Allows us to define forms using menus, fill-in-the forms screens, and a comprehensive on-line help system. SQL forms stores object definition in a set of tables in an ORACLE database.
- Allows operations to execute pre-defined forms interactively.
- Allows you to create form definition file that SQL forms can execute from a text file, or a flat file representation.
- Allows to commit between various representation of a form
- Create text file from definition stored in database tables.

- Insert and text files into database tables.
- Create text files in the version 3.0 format from text files created by previous versions of SQL forms.

SQL REPORT WRITER : With SQL report writer we can develop a wide variety of reports with precise control over their layout.

FEATURES OF SQL REPORT WRITER:

- Is an application development tool for designing and executing reports.
- ANSI standard SQL used to retrieve records in the report.
- Menu-driven, simple spread sheet-style screens.
- Can display an unlimited numbers of breaks with calculations and summaries.

SYSTEM DESIGN

CHAPTER - 4 SYSTEM DESIGN

4.1. OUTPUT DESIGN

A major step in design is the preparation of input and the design of output report in a form acceptable to the user. Computer output is the most important and direct source of information to the user. Efficient, intelligible Output design will improve the system's relationship with the user and help in decision making.

The main purpose of any system is to process the data and give the desired information to the user. Information is nothing but the output from the system.

MODULE - I OUT PATIENT MANAGEMENT

Various reports generated are

- daily census report
- lab reports
- list of patients specialists wise
- list of doctors timings
- op billing
- daily credit letter list
- credit summary bills.

MODULE -II EQUIPMENT MAINTENANCE

Various reports generated are

- equipment list
- supplier list
- contract list
- list of equipments under warranty
- list of equipments installed in a period
- equipment status report.

4.2. INPUT DESIGN

For any kind of output from the system there should be some input and processing. Input design is the process of concerting user-oriented inputs to a computer based format.

MODULE - I OUT PATIENT MANAGEMENT

- patients demographic details
- name, religion, age, sex etc.
- patients clinical details
- unit, doctor, diagnosis etc.
- credit patient details
- company name, employee id, designation, letter date
- patients investigation and physiotherapy details
- patient name, investigation name, charges.
- consultancy timings
- doctor name, timings, registration fees
- investigation and other lab details
- particulars, charges.

MODULE - II EQUIPMENT MAINTENANCE

- equipment details
- name, supplier, model, dates etc.
- supplier details
- name, address, tele no etc.
- equipment problem and action details
- name, nature of complaint, complaint date, action date, person who took the action.
- spare part inventory details

Input sources can be entered and processed into the Input sources can be entered and processed into the system in varieties of ways. ON-LINE DATA ENTRY is one of them. This system is using on-line Data entry mode for processing the data at the entry point itself. The system used MENU method and formatted FORM approach to enter the data.

The software environment of the proposed system provides a dynamic tool for creating the data entry screen which can enforce the stated checks while entering the data and can give on line help to the user. This tool is known as SQL forms. Using this tool various screen have been designed for entering the data with proper checks and helps. The system is menu-driven and is user-friendly.

As the input to the system is through the forms, various data entry screens will be discussed in detail under forms design section of this chapter.

4.3 DATABASE DESIGN

Database design is one of the most important steps in the system design phase of the system development. A good design can reduce many of the problems of the system. It reduces redundancy and anomalies and at the same time it enforces the required integrities like referential integrity etc. Specifically with the relational databases management system it is more easy to design a database which can possible enforce all the required securities and integrities which can lead to secured and consistent database.

After knowing all the requirements and input the following tables are designed to store the data in a relational manner. Most of the tables are referencing each other to maintain the consistency. Most of the tables are normalized to the extent possible but a few tables are denormalized to some extent in order to reduce the query time and the number of times the databases is accessed.

A number of indexed is formed on the combination of keys normally used in queries. The Oracle database maintains the indexes on primary/unique keys and uses implicitly whenever a query is fired.

TABLES DESIGNED

MODULE - I OUT PATIENT MANAGEMENT

1. OP_REGISTER This is used to store the patients demographic and clinical details.

FIELD NAME	TYPE	SIZE	NULL?
OP_CODE	NUMBER	9	P.K
CATEGORY	CHAR	2	NN
C_CODE	CHAR	6	NN
OP_NAME	CHAR	15	NN
RELIGION	CHAR	10	NN
AGE	NUMBER	2	NN
SEX	CHAR	1	NN
INCOME_GROUP	CHAR	2	NN
ADD1	CHAR	25	NN
ADD2	CHAR	25	NN
ADD3	CHAR	25	NN
REG_DATE	DATE	8	NN
UNIT	CHAR	17	NN
DNAME	CHAR	18	NN
DIAGNOSIS	CHAR	15	NN
REG_FEE	NUMBER	9	NN

2. EMD_REG This table is used to store the clinical details and the demographic details of the patient. Though it looks very similar to that of the op_register this starts functioning only after the op_registration is closed. Also here the reg_fee is high compared to that of the op_reg_fee.

FIELD	TYPE	SIZE	NULL?
E_CODE	NUMBER	9	PK NN
CATEGORY	CHAR	2	NN
C_CODE	CHAR	2	NN
E_NAME	CHAR	15	NN
RELIGION	CHAR	10	NN
AGE	NUMBER	2	NN
SEX	CHAR	1	NN
I_G	CHAR	2	NN
ADD1	CHAR	25	NN
ADD2	CHAR	25	NN
ADD3	CHAR	25	NN
E_TIME	CHAR	8	NN
D_NAME	CHAR	15	NN
UNIT	CHAR	17	NN
REG_FEE	NUMBER	9	NN
DIAGNOSIS	CHAR	15	NN

3. COLLECTIONS This table is used to store the details of the collections made from the patients the and there.

FIELD	TYPE	SIZE	NULL?
R_CODE	CHAR	5	PK NN
C_DATE	DATE	8	
OP_CODE	NUMBER	9	
E_CODE	NUMBER	9	
OP_NAME	CHAR	15	
E_NAME	CHAR	15	
PARTICULARS	CHAR	15	
AMT	NUMBER	7	

4. CREDIT This table is used to store the information of the credit letter details brought by the patients for credit payment from their respective organisation.

FIELD	TYPE	SIZE	NULL?
C_CODE	CHAR	6	PK NN
ORG_NAME	CHAR	15	
OP_NAME	CHAR	15	NN
LETTER_DATE	DATE	8	
EMP_ID	CHAR	7	
DESIG	CHAR	15	

5. INVST (transaction) This table is used to store the information of the various patients who has undergone various investigations.

FIELD	TYPE	SIZE	NULL?
SAMPLE_NO	NUMBER	9	PK NN
I_CODE	NUMBER	5	
OP_CODE	NUMBER	9	
E_CODE	NUMBER	9	
OP_NAME	CHAR	15	
PARTICULARS	CHAR	40	
AMT	NUMBER	7	
INV_DATE	DATE	8	

6. PHYS (transaction) This tables used to store the information of the various details of the patients who has undergone various physiotherapy treatments.

FIELD	TYPE	SIZE	NULL?
SAMPLE_NO	NUMBER	9	PK NN
P_CODE	NUMBER	5	
OP_CODE	NUMBER	9	
E_CODE	NUMBER	9	
OP_NAME	CHAR	15	
PARTICULARS	CHAR	30	
AMT	NUMBER	7	
PHY_DATE	DATE	8	

7. BILL (transaction) This table is used to prepare the final bill for the outgoing patients after the completion of their treatments.

FIELD	TYPE	SIZE	NULL?
B_CODE	NUMBER	9	PK NN
B_DATE	DATE	8	
OP_CODE	NUMBER	9	
C_CODE	CHAR	6	
E_CODE	NUMBER	9	
OP_NAME	CHAR	15	
E_NAME	CHAR	15	
AMT	NUMBER	7	
RECOMM_BY	CHAR	15	
DISCOUNT	NUMBER	6	
TOTAL_AMT	NUMBER	7	

8. INVESTIGATION (master) This table is used to have the master information of all the investigations that are made in the hospital.

FIELD	TYPE	SIZE	NULL?
I_CODE	NUMBER	5	PK NN
PARTICULARS	CHAR	40	NN
AMT	NUMBER	7	NN

9. PHYSIOTHERAPY(Master) This table is used to have the master information of all the

physiotherapy investigations that are undertaken in the hospital.

FIELD	TYPE	SIZE	NULL?
P_CODE	NUMBER	5	PK NN
PARTICULARS	CHAR	40	NN
AMT	NUMBER	7	NN

10. DUTY (master) This table is used to have the information of all the doctors work in the hospital.

FIELD	TYPE	SIZE	NULL?
D_CODE	NUMBER	5	PK NN
DNAME	CHAR	15	NN
D1.....D7	CHAR	3	NN
MOR_EVE	CHAR	3	NN
R_NO	NUMBER	3	NN
REG_FEE	NUMBER	3	NN
UNIT	CHAR	17	NN

11. CATEGORY This table has the details of the patient category. Either cash or credit patient.

FIELD	TYPE	SIZE	NULL?
TYPE	CHAR	3	NN

12. IDS

This table is used to have the information whether the patient is allowed to give discount or not. It contains the values of Y,N.

FIELD	TYPE	SIZE	NULL?
TYPE	CHAR	1	NN

13. DISOCUNT

This table is used to have the various percentages, say from 1% to 10% so that the management can give the percentage discount to the patients.

FIELD	TYPE	SIZE	NULL?
TYPE	CHAR	3	NN

14. INVPHY

This table is used to have the type of the amt the patient made. It contains the values of INV, PHY, ADV.

FIELD	TYPE	SIZE	NULL?
TYPE	CHAR	3	NN

15. COINPH

This table issued to store the information of the amt that has been by the patient. This is used for the receipt to the patients for various investigations.

FIELD	TYPE	SIZE	NULL?
RRCODE	CHAR	9	
AMT	NUMBER	7	
CODE	CHAR	4	

16. INCOME_GROUP The list of values stored in this table is LI, MI,HI.

FIELD	TYPE	SIZE	NULL?
TYPE	CHAR	3	

17. PAT_TYPE The list of values stored in this table is EMD,OP.

FIELD	TYPE	SIZE	NULL?
TYPE	CHAR	3	

18. PATIENT_HIS This table is used to maintain the history of the patients. This is used whenever a patient revisits.

FIELD	TYPE	SIZE	NULL?
OP_CODE	NUMBER	6	
REG_DATE	DATE	8	
DNAME	CHAR	15	
UNIT	CHAR	17	
DIAGNOSIS	CHAR	15	
REG_FEE	NUMBER	3	
PRE_VISIT	DATE	8	

19. REP1

This table is used to store the information of the investigation transactions, various patients has made.

FIELD	TYPE	SIZE	NULL?
R_CODE	CHAR	9	
I_CODE	NUMBER	5	
PARTICULARS	CHAR	40	
AMT	NUMBER	5	

20. REP2

This table is used to store the information of the physiotherapy transactions, various patients has made.

FIELD	TYPE	SIZE	NULL?
R_CODE	CHAR	9	
P_CODE	NUMBER	5	
PARTICULARS	CHAR	40	
AMT	NUMBER	5	

Also tables has been created for auto generation for several fields. The tables are

- OP_PARA
- OP_CREDIT
- INV_PARA
- PHY_PARA
- COLL_PARA
- BILL_PARA
- EMD_AUTO

All these tables contain the same type of fields. They are

FIELD	TYPE	SIZE	NULL?
PAR_CODE	CHAR	4	
PAR_NUMBER	NUMBER	9.	

MODULE - II EQUIPMENT MAINTENANCE

1. SUPLIER_MASTER — This table is used to maintain the master details of the suppliers who usually supply materials.

FIELD	TYPE	SIZE	NULL?
SUPPLIER_CODE	CHAR	7	PK NN
SUPP_NAME	CHAR	20	
ADD1	CHAR	20	
ADD2	CHAR	20	
ADD3	CHAR	20	
TELE_NO	NUMBER	6	

2. EQUIP_DETAILS This table is used to store the equipment details. The equipment purchased by the management is the one that is stored here.

FIELD	TYPE	SIZE	NULL?
EQ_CODE	CHAR	7	
E_CODE	NUMBER	9	PK NN
NAME	CHAR	15	
MODEL	CHAR	6	
VALUE	NUMBER	7	
UNITS	NUMBER	4	
DEPARTMENT	CHAR	10	
MANUFACTURER	CHAR	15	
SUPPLIER_CODE	CHAR	7	
PURCHASE_DATE	DATE	8	
INSTALL_DATE	DATE	8	
WARRANTY_FROM	DATE	8	
WARRANTY_TO	DATE	8	

3. BREAKDOWN This table is used to store the informations of the equipment which gets breakdown during process.

FIELD	TYPE	SIZE	NULL?
COMP_NO	NUMBER	9	PK NN
MODEL	CHAR	6	
EQ_SNO	NUMBER	9	
I_NO	CHAR	10	
I_DATE	DATE	8	
DEPT	CHAR	10	
COMP1	CHAR	20	
COMP2	CHAR	20	
COMP3	CHAR	20	
ATTEND_DATE	DATE	8	
ACTION_BY	CHAR	10	
ACC1	CHAR	10	
ACC2	CHAR	10	
STATUS	CHAR	10	
S_CHARGES	NUMBER	7	

4. EQUIP_SNO This table is used to store the equipment serial number for the equipments.

FIELD	TYPE	SIZE	NULL?
EQ_CODE	NUMBER	9	
DEPARTMENT	CHAR	10	
INSTALL_DATE	DATE	8	
EQ_SNO	NUMBER	9	PK NN

5. SER_CONT

This table is used to store the details of the service contracts that has been made.

FIELD	TYPE	SIZE	NULL?
SC_NO	NUMBER	9	PK NN
EQ_CODE	NUMBER	7	
S_NO	CHAR	7	
MODEL	CHAR	6	
UNITS	NUMBER	4	
C_AMT	NUMBER	7	
C_S_DATE	DATE	8	
C_E_DATE	DATE	8	

6. EQUIPMENT

This table contains the various equipment name and its codes.

FIELD	TYPE	SIZE	NULL?
EQ_CODE	CHAR	7	
NAME	CHAR	10	

7. STOCK

This table is used to have the stock details for each part_no that is available in the stock_department.

FIELD	TYPE	SIZE	NULL?
P_NO	NUMBER	9	
DESC	CHAR	10	
STOCK	NUMBER	7	

8. SPARE_STOCK

This stock is used to store the informations regarding the stocks for each department.

FIELD	TYPE	SIZE	NULL?
EQ_SNO	NUMBER	9	
P_NO	NUMBER	9	
DES	CHAR	10	
DEPT	CHAR	10	
STOCK	NUMBER	5	

9. STATUS

This table is used to list the values of the status. It has the values of WORKING, NOT_WORKING, RECOMM_F_C.

FIELD	TYPE	SIZE	NULL?
STATUS	CHAR	10	

10. DEPT_STOCK_LEVEL This table is used to maintain the level of stocks of departments.

FIELD	TYPE	SIZE	NULL?
P_NO	NUMBER	9	
DES	CHAR	10	
STOCK	NUMBER	9	
DEPT	CHAR	10	
EQ_SNO	NUMBER	9	

11. DEPT_STOCK This table is used to store the information regarding the consumptionof stocks by various departments.

FIELD	TYPE	SIZE	NULL?
EQ_CODE	CHAR	7	
EQ_SNO	NUMBER	9	
DEPT	CHAR	10	
P_NO	NUMBER	9	
DES	CHAR	10	
STOCK	NUMBER	9	
STOCK_CONS	NUMBER	9	

12. SPARE_PROCURE This table is used to store the information of the spare procurement.

FIELD	TYPE	SIZE	NULL?
EQ_CODE	CHAR	7	
EQ_SNO	NUMBER	7	
DEPT	CHAR	10	
P_NO	NUMBER	9	
DES	CHAR	10	
UNITS	CHAR	4	
AMT	NUMBER	7	
PROCURE_DATE	DATE	8	
STOCK	NUMBER	9	

Also, two tables are used for auto generations. They are

- EQ_PARA
- SUP_PARA

Both contain the same type of fields. They are

PAR_CODE CHAR 4 and PAR_NUMBER NUMBER 9.

4.4 FORMS DESIGN

MODULE - I OUT PATIENT MANAGEMENT

The forms that are generated in this module are

1. OP_MAIN This form is a one which contains all the menus of the outpatient module. It is from here the user can choose his option.

2. OP_REG	This form is described for out_patient register. The function of this form include the registration of patients, modifications in future, patient revisits, enquiries about the patient, doctor, patient previous details etc can be processed through this form.
3. OP_INVST	This form is developed for investigation purpose. The function includes the various investigation the patient has been made. Also, if there is any modification it can also be get processed through this form.
4. OP_PHYS	This form is developed for physiotherapy purpose. The function includes the various physiotherapy the patient has been made. Also, if there is any modification it can also be get processed through this form.
5. OP_EMD	This is similar to that of the Op_regs. One thing it differ from the op_reg is that in the fee structure. Here the fee structure is higher than that of the op_reg_fee. This dept starts functioning after the closure of the op_counter.
6. OP_COLL	This form is developed for collection counter. It process for various collections made by the patients for their investigations.
7. OP_BILL	This form is developed for billing purposes.

8. OP_MASTER This form is created for the Master entries viz Investigation master, physiotherapy master, duty master. For all the entries addition, modification and deletion can be made.

9. REPORTS This form is used to generate various reports that the module has to be developed. In this form a link has been made between the SQL forms 3.0 and the SQL report writer 1.2

MODULE - II EQUIPMENT MAINTENANCE

The various forms generated for this module are

1. EQUIP_MENU This form is used to generate a menu from where the user can pick his choice.

2. SUPPLIER_MASTER This form is developed for the data entry of suppliers who supply parts. In this form, addition , deletion, modification can take place. This is a master entry form.

3. EQUIP_DETAILS	This form is developed to maintain the equipment details and the serial nos. of the equipment code and the department where the equip. are placed.
4. SER_CONT	Service_contract is a one which is a data entry form where the contract start and the end date can be processed for the particular equipment which has the distinct serial number.
5. SPARES_PROCURE	This form is developed, where incoming stocks are being entered and the stocks should be updated for the part number in the stock. Also, the parts supplied to the department is made here. This was maintained by the Bio Medical Engineering dept.
6. SPAREE	This form is developed for the use of BME, This is used for Master entry. Whenever a new product is entered in this, it get stored in the tables stock and dept_stock.
7. BREAKDOWN	This form is developed to maintain the breakdown details of the particular machines.

8. SPARES_CONS	This form is used to maintain the data for the machine consumption of each dept of particular part number.
9. EQUIPMENT	This is used to maintain master entry for equipment details.
10. REPORTS	This form issued to generate various reports that are required for the equipment maintenance module.

4.5 REPORTS DESIGN

MODULE - I OUT PATIENT MANAGEMENT

The various reports that is generated in this module by using reportwriter 1.2 are

1. DAILY CREDIT LETTER

This report lists all the credit letter for the current sysdate.

2. DAILY COLLECTIONS

This report lists all the collections made on a day(sysdate) and a final sum also will be listed. This is used as a daily collection ledger.

3. DOCTOR LIST (CURRENT DAY)

This report lists all the doctors who are onduty on a day(sysday)

4. SURGEON WISE PATIENT LIST

This report lists all the patient name with the corresponding doctors.

5. CLINICAL DETAILS OF PATIENTS

This report lists all the clinical details of the patients.

6. DEMOGRAPHIC DETAILS OF PATIENTS

This report lists all the demographic details of the patients.

7. INVESTIGATION REPORT

This report lists all the transactions made in a day(sysday). Also, a report is generate for receipt for a particular patient when the patient is paying amount in the collection counter.

8. PHYSIOTHERAPY REPORT

This report lists all the transactions made in a day(sysday). Also, a report is generate for receipt for a particular patient when the patient is paying amount in the collection counter.

MODULE - II EQUIPMENT MAINTENANCE

The various reports generated in this module are

1. EQUIPMENT LIST

This report lists all the equipment purchased by the BME.

2. SUPPLIER LIST

This lists all the suppliers who supply parts to the BME.

3. EQUIPMENT WARRANTY LIST

This lists all the equipments which has got warranty.

4. EQUIPMENT STATUS LIST

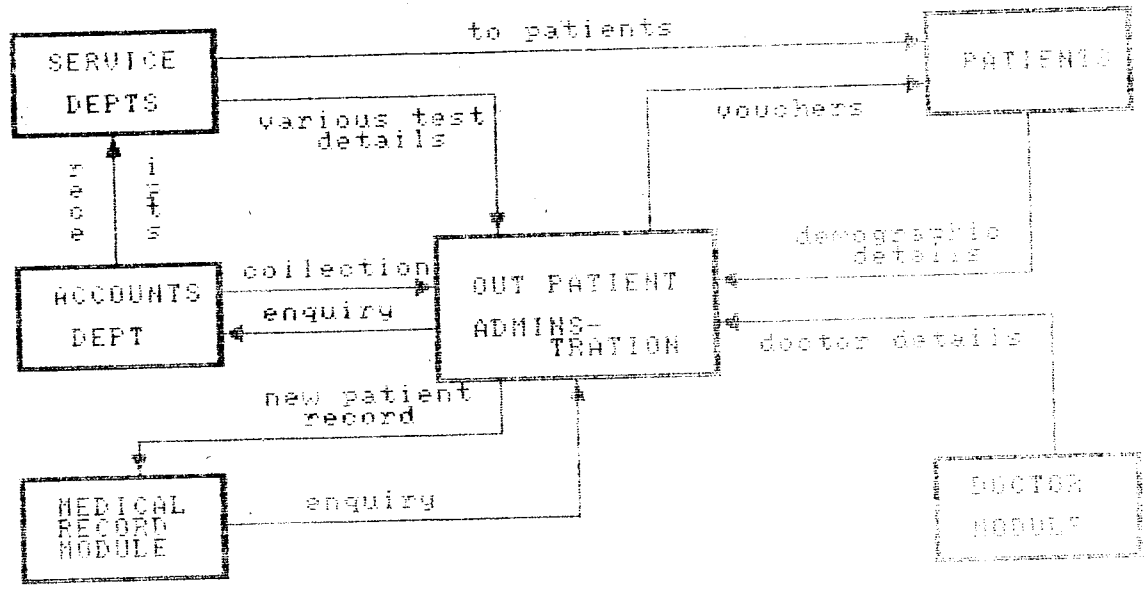
This lists the status of all the equipments.

5. EQUIPMENT INSTALL DATE

This lists all the equipment with their installation date.

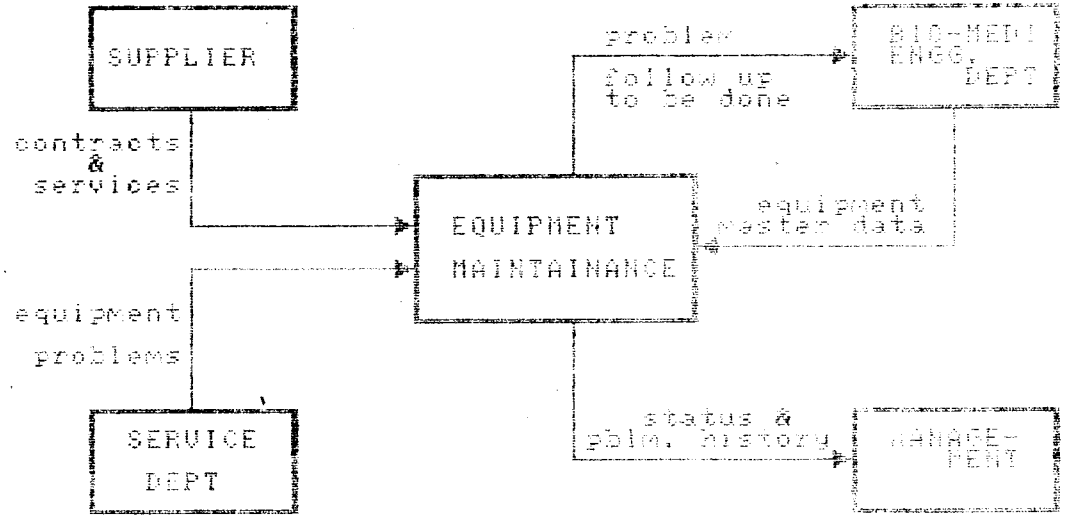
OUT PATIENT MODULE

(SYSTEM DIAGRAM)



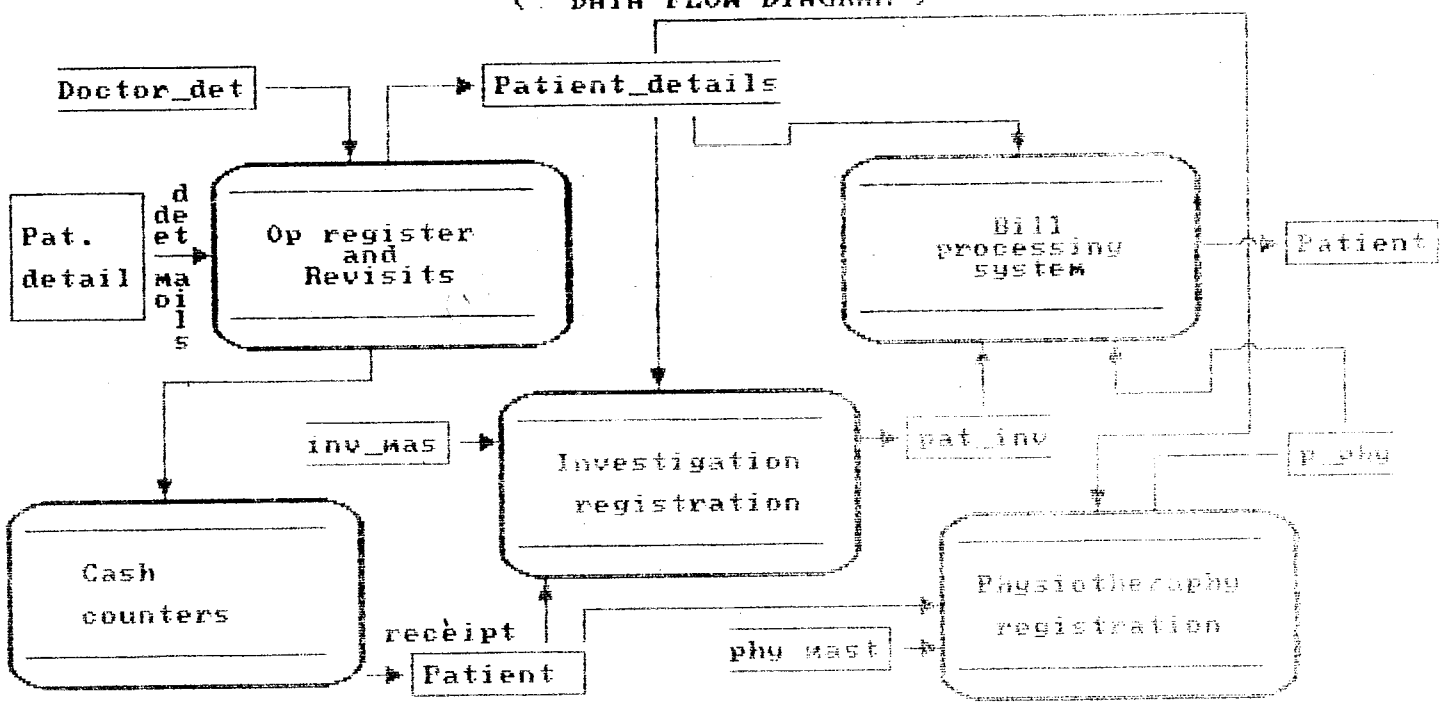
EQUIPMENT MAINTAINANCE MODULE

(SYSTEM DIAGRAM)



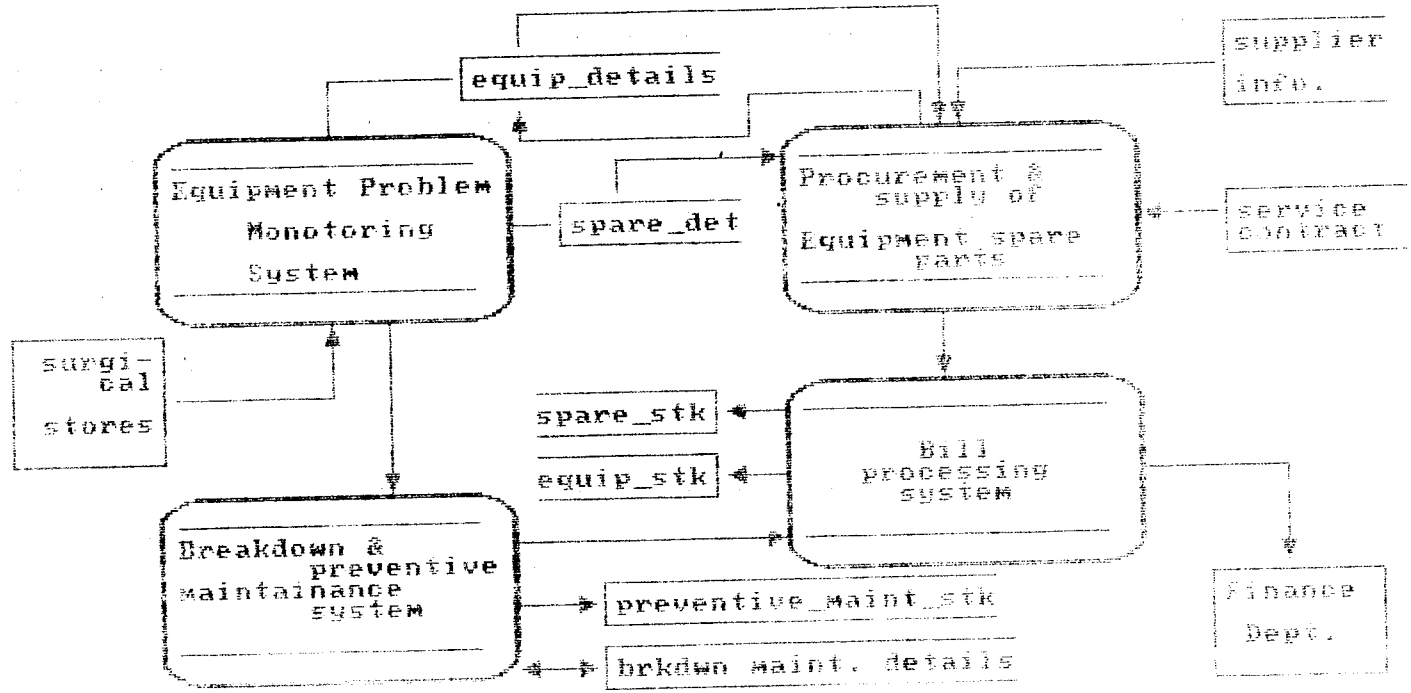
OUT-PATIENT MODULE

(DATA FLOW DIAGRAM)



EQUIPMENT MAINTAINANCE MODULE

(DATA FLOW DIAGRAM)



APPENDIX

CONCLUSION

CONCLUSION

The Hospital Management System application has met its objective. This can be sensed by seeing that all the problems present in the manual system has been eradicated.

The system has been throughly tested with varied test data under various load conditions and was found to be fit for implementation. The system reliablity is high and enough securities have been provided in warding off frauds from entering the system.

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