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RESEARCH ARTICLE

DESIGN AND IMPLEMENTATION OF "HEALTH CENTER MANAGEMENT SYSTEM" FOR EFFICIENCY IN HOSPITALS AND DISPENSARIES

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ARTICLE INFO	ABSTRACT
	Health Center Management System is a software that incorporates features which are targeted at dealing with each and every aspect of a company's health center or dispensary. The system processes diverse data such as patient information, inventory control, medication management, generating purchase requisition, storing details of a patient's visit, generating reports, maintaining checklists. All of the above mentioned activities are implemented through a user friendly and simple interface. This software was developed in Microsoft Visual Studio 2010 (in C# language) having SQL Server 2008 as backend. The Health Center Management System can be entered using a username and password. It is accessible either by an administrator, doctor or medical assistant of the health center. Only they can add data into the database. The software also ensures new levels of efficiency, integration and accountability as every changes made to the database are monitored. It can be used in any Hospital, Clinic, Dispensary for maintaining patient details and their test results.

INTRODUCTION

Health of an employee is of vital importance to the functioning of an organization. For employees, a healthy life not only reduces risk for developing disabling or life threatening diseases and their associated costs, but also improves their everyday quality of life. Employers also benefit by keeping their employees healthy due to enhanced productivity, decreased employee absenteeism and various other reasons. Companies have on-site health centers where administrative operations are done manually at all of their factories. The Health Center Management System has been created out of this need, i.e. to computerize manual operations of a health center. The purpose was to develop software which is user friendly, simple, fast, cost – effective, and which also digitizes patient records so as to make data retrieval easy and efficient. It also means that patient data can be easily backed up, and be protected for confidentiality and from tampering through access control.

System Development

System which was currently in use is referred as AS-IS system where all the operations were done manually and is depicted as use case diagram. There were two types of end users involved – Doctor and medical assistant.
The role of the Doctor is as follows
- Examine patients and treat them

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- Act as Health Officer for the company
- Review patient's OPD record along with the medical history
- Review patient's accident record
- Review all the checklists (Housekeeping, Medical Assistant, Ambulance)
- Review details of bio medical waste disposal

The role of the Medical Assistants is as follows –
- Maintain all checklists
- Maintain registers that has a patient's OPD record, accident record, usage of rest area, sickness register
- Maintain a record about the stock of inventory kept in the health center
- Prepare yearly and monthly report of the activities of the Health Center and mail them to the authorities
- Act under direct supervision of Doctor and assist him in the required activities.

Limitations of the existing system
- Consumes large volume of paper work: Records are maintained in a register and hence lots of registers are being used in running the operations of the health center
- Manual work: No automation is present in the system
- Time consuming: Data is stored in different excel sheets in the system, and thus it takes some time to gather required information
- Lack of security of data: Any person visiting the health center can access the data
- Less accountability: No records are maintained as to who is making changes in the database
- Redundancy: This may occur due to human error while storing details

System which was developed is referred as TO-BE system and represented in the diagram. (Diagram 1)

The main focus of the proposed system was to create a system that

- accommodates all of the requirements of the users
- should be simple, user friendly and interactive
- should make data retrieval easier and faster
- requires low resources and should work in all configurations

The users in the following diagram are –

- Doctor, Medical Assistant, Safety Officer, HR personnel

The major differences between the 'AS-IS' and the 'TO-BE' are:

- OPD register, accident register, Sickness register, Rest area register has been combined into a single module called as 'Patient Visit'
- The data of the registers discussed in the above point are collected in a common 'Patient Visit' Database
- The checklists of Medical Assistant, Ambulance, Housekeeping are combined into a single module which shall be referred to as 'Checklist'

Advantages of proposed system

- Time required for performing operations decreases
- Data is more secure
- More accountability
- Amount of paper work decreases
- Lesser data Redundancy
- Easy retrieval of data

The software specification diagram of 'HEALTH CENTER MANAGEMENT SYSTEM' is shown in the diagramme. The specification diagram has been depicted via flowchart and designed according to the 'TO-BE' diagram. (Diagram 2)

After studying the TO-BE diagram and the Software Specification Diagram, a detailed data model of the database was prepared. The tables involved in the Health Center Management System were

- Checklist Master: To store details of checklist master data
- Complain Master: To store details of complain master data
- Investigation Master: To store details of investigation master data
- History Type Master: To store details of patient history master data
- Authenticate: Stores usernames and their corresponding password and designation
- Basic Details: Stores basic details of employees
- Patient History: Stores medical history of an employee
- Patient Visit: Stores details of a patient's visit to the health center
- Complain Details: Stores the details of complain made by the patient
- Investigation Details: Stores the details of investigations advised by the doctor to the patient
- Treatment Details: Stores details of treatment meted out to the patient
- Form 32: Stores details of Form – 32 of a patient

- Checklist: Records entry of checklists generated in the system
- Location Master: To store details of location master data
- Uom Master: To store details of unit of measurement master data
- Item Master: To store details of item master data
- Stock: Stores details of stocks present in the system
- Receipt_Table: Stores record of the slips used for purchasing items
- Item_Receipt: Stores details of items which have been purchased
- Issue_Table: Stores record of the slips used for issuing items
- Item_Issue: Stores details of items which have been issued
- Stock_Ledger: Records details of item which is to be generated in the stock ledger
- Stock Count: Stores record of items while taking the scheduled count of items

The whole database has been divided into two parts – Patient Management and Inventory Management, for better understanding. Patient Management deals with the aspects of the system involved with the patients, meanwhile Inventory Management deals with how data of items shall be stored in the database.
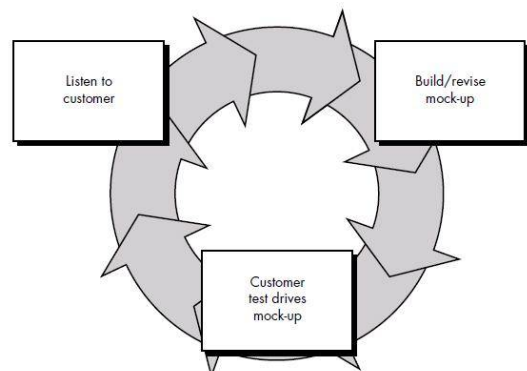
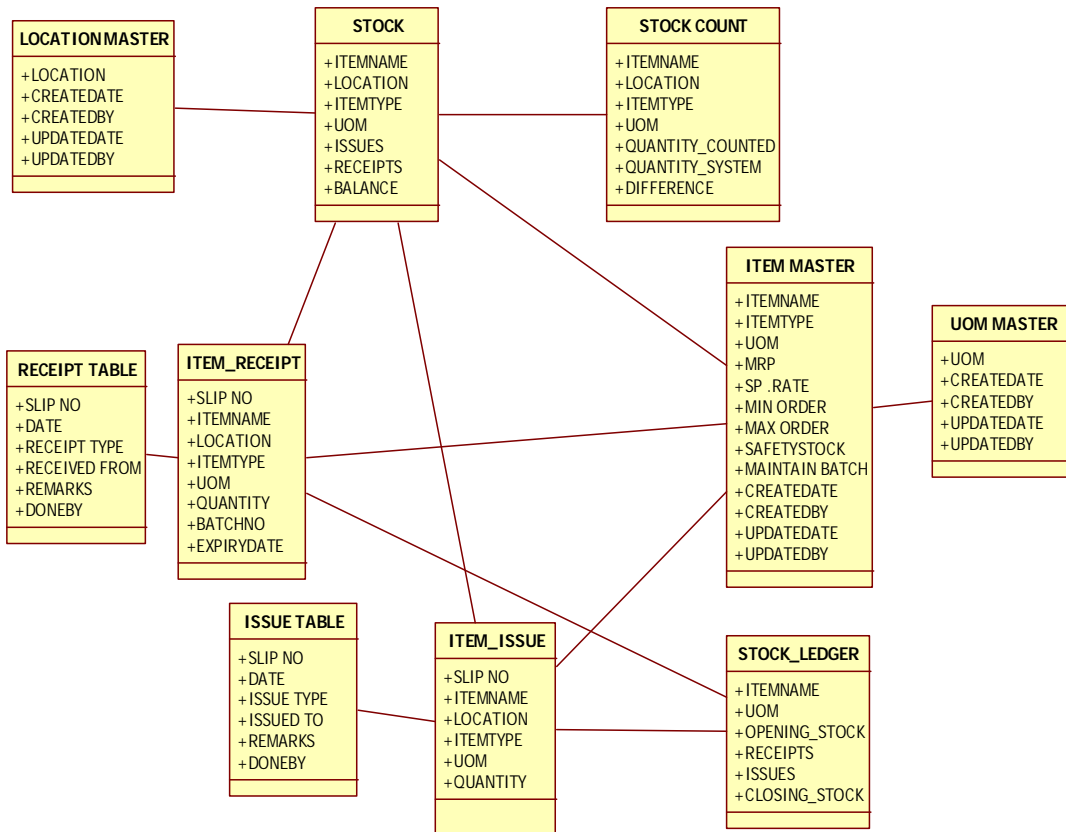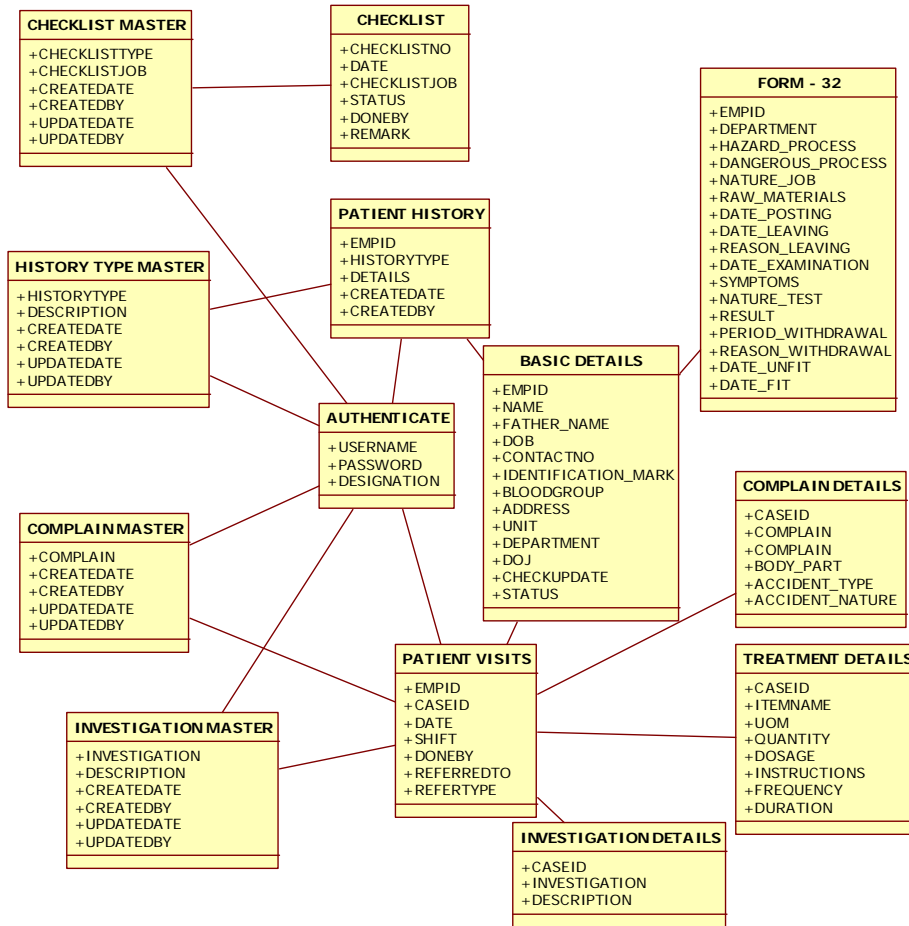### Patient Management and Inventory Management

The software development model to be used in this project is the prototype model. In this model only a few functions are implemented, the primary focus of the alpha is to have a functional base code on to which features may be added. After coding, the user is asked to evaluate the program and another prototype will be built based on their feedback. Again the cycle returns to customer evaluation. The cycle starts by listening to the user, followed by building or revising a mock-up, and letting the user test the mock-up, then back.

The reasons for using this model are:

- Availability of time
- Quicker user feedback is available leading to better solutions.
- Missing functionality can be identified easily
- Since in this methodology a working model of the system is provided, the users get a better understanding of the system being developed
- Confusing or difficult functions for the users can be identified

The following diagram illustrates the prototype model.

CHECKLIST MASTER
+CHECKLISTTYPE
+CHECKLISTJOB
+CREATEDATE
+CREATEDBY
+UPDATEDATE
+UPDATEDBY

CHECKLIST
+CHECKLISTNO
+DATE
+CHECKLISTJOB
+STATUS
+DONEBY
+REMARK

FORM - 32
+EMPID
+DEPARTMENT
+HAZARD_PROCESS
+DANGEROUS_PROCESS
+NATURE_JOB
+RAW_MATERIALS
+DATE_POSTING
+DATE_LEAVING
+REASON_LEAVING
+DATE_EXAMINATION
+SYMPTOMS
+NATURE_TEST
+RESULT
+PERIOD_WITHDRAWAL
+REASON_WITHDRAWAL
+DATE_UNFIT
+DATE_FIT

PATIENT HISTORY
+EMPID
+HISTORYTYPE
+DETAILS
+CREATEDATE
+CREATEDBY

HISTORY TYPE MASTER
+HISTORYTYPE
+DESCRIPTION
+CREATEDATE
+CREATEDBY
+UPDATEDATE
+UPDATEDBY

BASIC DETAILS
+EMPID
+NAME
+FATHER_NAME
+DOB
+CONTACTNO
+IDENTIFICATION_MARK
+BLOODGROUP
+ADDRESS
+UNIT
+DEPARTMENT
+DOJ
+CHECKUPDATE
+STATUS

AUTHENTICATE
+USERNAME
+PASSWORD
+DESIGNATION

COMPLAIN DETAILS
+CASEID
+COMPLAIN
+COMPLAIN
+BODY_PART
+ACCIDENT_TYPE
+ACCIDENT_NATURE

COMPLAIN MASTER
+COMPLAIN
+CREATEDATE
+CREATEDBY
+UPDATEDATE
+UPDATEDBY

PATIENT VISITS
+EMPID
+CASEID
+DATE
+SHIFT
+DONEBY
+REFERREDTO
+REFERTYPE

TREATMENT DETAILS
+CASEID
+ITEMNAME
+UOM
+QUANTITY
+DOSAGE
+INSTRUCTIONS
+FREQUENCY
+DURATION

INVESTIGATION MASTER
+INVESTIGATION
+DESCRIPTION
+CREATEDATE
+CREATEDBY
+UPDATEDATE
+UPDATEDBY

INVESTIGATION DETAILS
+CASEID
+INVESTIGATION
+DESCRIPTION

LOCATION MASTER
+LOCATION
+CREATEDATE
+CREATEDBY
+UPDATEDATE
+UPDATEDBY

STOCK
+ITEMNAME
+LOCATION
+ITEMTYPE
+UOM
+ISSUES
+RECEIPTS
+BALANCE

STOCK COUNT
+ITEMNAME
+LOCATION
+ITEMTYPE
+UOM
+QUANTITY_COUNTED
+QUANTITY_SYSTEM
+DIFFERENCE

ITEM MASTER
+ITEMNAME
+ITEMTYPE
+UOM
+MRP
+SP .RATE
+MIN ORDER
+MAX ORDER
+SAFETYSTOCK
+MAINTAIN BATCH
+CREATEDATE
+CREATEDBY
+UPDATEDATE
+UPDATEDBY

UOM MASTER
+UOM
+CREATEDATE
+CREATEDBY
+UPDATEDATE
+UPDATEDBY

RECEIPT TABLE
+SLIP NO
+DATE
+RECEIPT TYPE
+RECEIVED FROM
+REMARKS
+DONEBY

ITEM_RECEIPT
+SLIP NO
+ITEMNAME
+LOCATION
+ITEMTYPE
+UOM
+QUANTITY
+BATCHNO
+EXPIRYDATE

ISSUE TABLE
+SLIP NO
+DATE
+ISSUE TYPE
+ISSUED TO
+REMARKS
+DONEBY

ITEM_ISSUE
+SLIP NO
+ITEMNAME
+LOCATION
+ITEMTYPE
+UOM
+QUANTITY

STOCK_LEDGER
+ITEMNAME
+UOM
+OPENING_STOCK
+RECEIPTS
+ISSUES
+CLOSING_STOCK

CONCLUSION

The project Health Center Management System is for computerizing the working of a company's health center. The software takes care of all the requirements of an average health center or dispensary. With the software user can store information related to employees coming at the health center, provide prescriptions and investigation details. The user can also generate reports, maintain inventory records, import data to system and edit database if necessary. Thus the Health Center Management System fulfills its primary purpose i.e. to provide a one-stop solution to its users and provide easy and effective storage of information related to patients that come to the hospital.

Benefits of the System

- Accountability and traceability is increased
- Data retrieval has become faster and easier
- Reduction in usage of paper work
- Data can be imported easily to the system. User need not create record for each employee, they can directly import a list of employees and their details into the system
- Offers users facility to customize their data. Important data in the system are not static and are completely editable through the Master databases.
- Data is more organized

Future Scope

- The facility to e-mail shall be added to the system
- Users can add photos of the employees in the future versions
- Currently, the system imports data pertaining to the patients only. Later on, the system shall import data related to inventory too
- A patient appointment scheduler shall be added to the system Acknowledgement

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