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Database Management in Healthcare Industries

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ABSTRACT: Computers have revolutionized the healthcare industry. Database management at clinics and hospitals has become an easy job with the arrival of computers. Computers help to keep track of all the patient's medical history, stock of medicines, purchases and sales, staff information, everything. The required information is available at the click of a button. Storing medical reports of millions of patients is easier with computers. Storage of data in computers is an eco-friendly way of storing information.

The healthcare industry faces a unique set of challenges in modernizing its infrastructure. Healthcare IT Executives are being tasked with developing and operating solutions that integrate data from a range of patient, clinical, and back office systems to healthcare providers, patients, payers, technology and pharmaceutical companies.

In view of the requirements of the hospital, I have developed a desktop application which can successfully manage the hospital database.

KEYWORDS: Healthcare industry, database management, java, MySQL, input design, output design, dataflow diagram, database table design.

I. INTRODUCTION

In India, the existing system for database management is manual in working in many primary health centres, district hospitals as well as government hospitals. There are several people required for managing this manual system so there is wastage of human power. Several files are used for recording the information about the patient. In file system various types of error can occur like inconsistency in database and redundancy of data. There is wastage of time for gathering any type of typical information about the patient. The files are not secure and there are chances of losing data. Billing for patients is also time consuming and a difficult task. There is no backup data, in case any mishappening occurs. Through the existing system, if at any time you require instant report about patient's details, then it would require a lot of time, and there is a probability of errors also.

In this technological era, computers are replacing old techniques of keeping records and other information in bulks of files. The tradition of maintaining files manually is replaced by saving records online or offline.

Today, India is considered to be the premier location for availing healthcare services and IT could help modernize the healthcare sector to a great extent, thus making the day-to-day functions in a hospital much faster. The Indian healthcare sector is witnessing a phase of revolutionary change with the implementation of IT at various levels of functioning. This effective deployment of IT solutions presents the possibility of turning modern hospitals into paperless entities. Over the last decade, IT has been recognized as an integral part of any modern healthcare organization that wishes to maintain a competitive edge over its peers.

II. RELATED WORK

In [1] authors have a point of view that, with the accelerated increase in human population, the amount of information and records is also becoming humongous in almost every aspect that may be considered. Handling such huge amounts of data has now become a backbreaking task. Handling involves – Inserting all the records accurately, displaying particular records according to the need, updating them as and when required and lastly deleting them when no longer



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of any use. These problems occur especially in large organizations like hospitals where extensive amount of data is added and updated on a daily basis.

Regarding the future scope of the desktop applications, the authors opined that with technological advancements booming, and fast paced lives of people, internet has crawled up in our lifestyle in such a way that we have become accustomed to getting everything done for us just in a few clicks. Therefore if this hospital care management system's desktop application is developed on web, it would bring about a huge change in the health care sector, as patients could book appointments with their doctors online, they could consult and leave messages for their doctors in times of emergency. A portal could be established where patients could get medicines and reports delivered to their homes. Doctors could post educational blogs for patients. The possibilities that Internet can establish are innumerable, hence if this application is converted to web using PHP, HTML and CSS it would be a significant step in making everyone's life a lot easier.

In [2] authors suggested that Hospital Management System not only provides an opportunity to the hospital to enhance their patient care, but also can increase the profitability of the organization. Hospital administrators would be able to significantly improve the operational control and thus streamline operations. This would improve the response time to the demands of patient care because it automates the process of collecting, collating and retrieving patient information. The authors recommended that hospitals currently practicing the manual system Hospital Management should switch to the electronic system because it is more efficient and easier to use. Also, since the use of computers is growing fast globally, introducing the electronic system will enable hospitals fit into the current global trend.

III. METHODOLOGY

1. For developing this application, java is selected as the front end and MySQL as the back end.
2. The proposed application can run on different operating systems like Windows 98/2000/XP/7/VISTA etc.
3. Moderate amount of memory (500 MB hard-disk space, 128 MB RAM) is required to store this application.

IV. PROPOSED APPLICATION

A. Key features of the application:

1. It helps to computerize the process of gathering, assembling and retrieving patient information. Thus it would help to improve the reply time to the demands of patient care. It can generate precise information relating to the patient on time that helps in clinical audit.
2. It records information about the availability of doctors, their field of specialization, and other relevant matters.
3. It manages the allocation of different rooms to the patients of the hospital.
4. This application is able to keep track of the information relating to patients admitted to the hospital. It stores their past medical history, current health issues etc.
5. It maintains the record of the bills and reports of the patients.

B. Input design:

1. Login screen
2. Control panel consists of four options namely 'Patient', 'Doctor', 'Billing' and 'Reports'.
3. Options like 'Add Data', 'Modify Data', 'View Data', 'Display Patient's Report' and 'Display Doctor's Report'.
4. Buttons like 'LOGIN', 'BACK', 'EXIT', 'ADD', 'CLEAR', 'SEARCH', 'MODIFY', 'DEPOSIT'.
5. List for selecting blood group, type of room.
6. Radio button for selecting gender.
7. Text boxes for entering patient's name, room number, patient number, contact number, date of birth, attending doctor id, doctor's name, his contact number, his id and his working hours.
8. Text boxes which can accommodate multiple lines for entering Patient's address his medical history and his current disease, doctor's address and his field of specialization.

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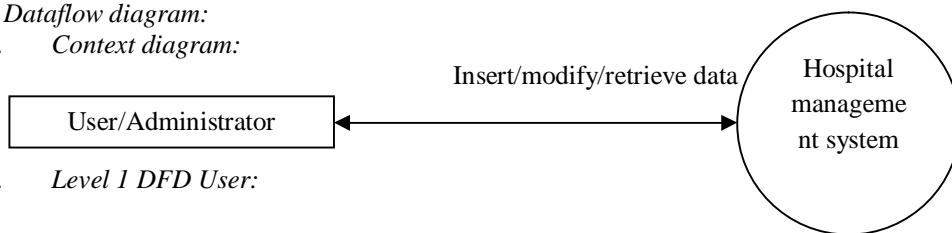
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C. Output design:

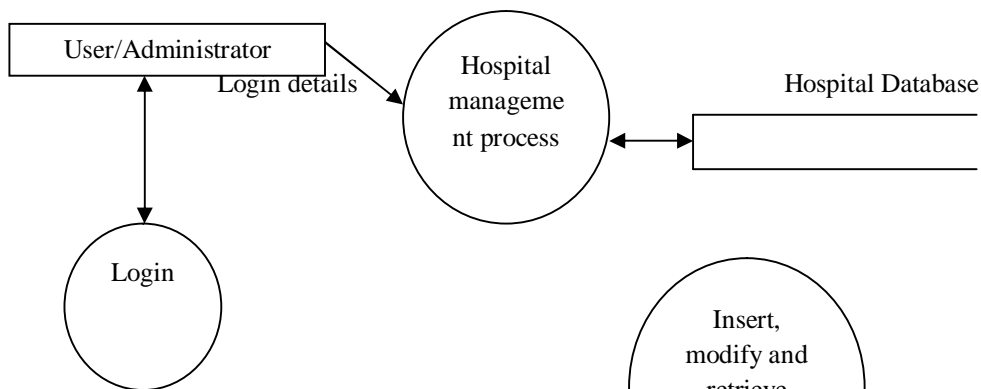
1. Display screen showing Patient's information
2. Display screen showing Doctor's information
3. Display screen showing Billing information
4. Display screen showing doctor's and patient's tables from the database.

D. Dataflow diagram:

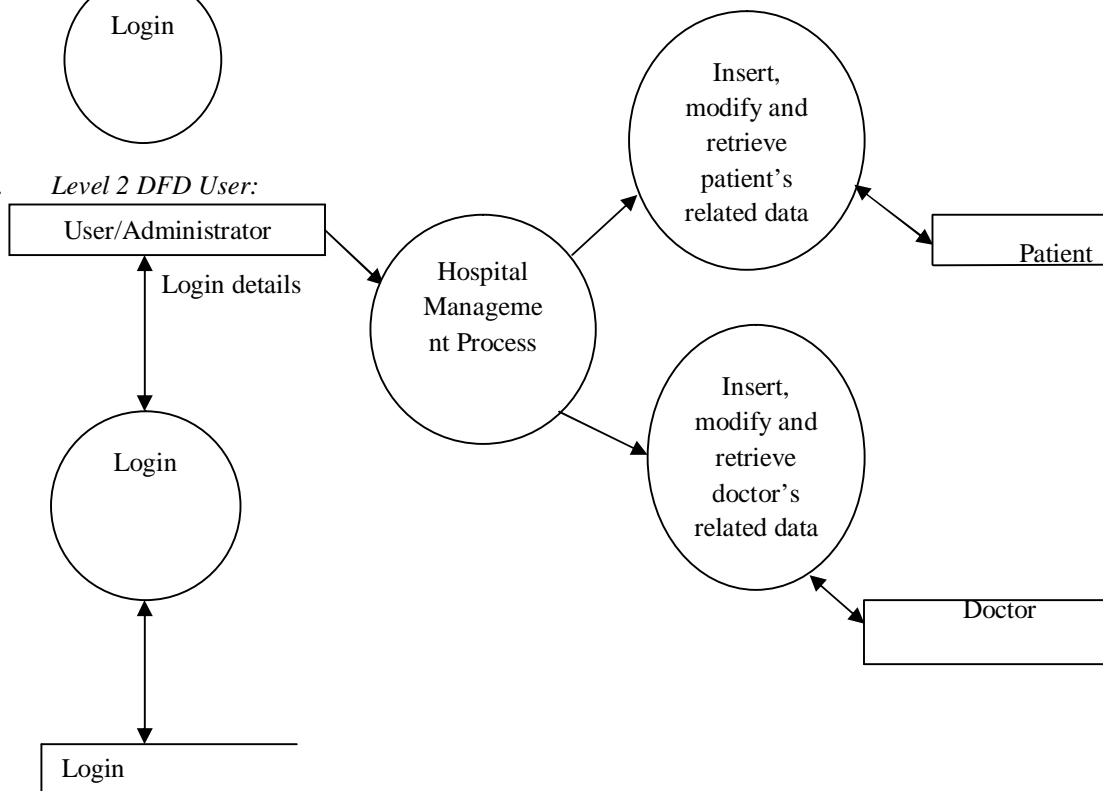
i. Context diagram:



ii. Level 1 DFD User:



iii. Level 2 DFD User:



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E. Database table design:

i. Table name: **login**

Field	Type	Null	Key	Default	Extra
user	varchar<30>	YES		NULL	
pswd	varchar<30>	YES		NULL	

ii. Table name: **doctors**

Field	Type	Null	Key	Default	Extra
did	int<11>	NO	PRI	NULL	
name	varchar<25>	NO		NULL	
address	varchar<50>	NO		NULL	
Contact	int<10>	NO		NULL	
specialization	varchar<35>	NO		NULL	
workfrom	int<5>	NO		NULL	
workto	int<5>	NO		NULL	

iii. Table name: **patient**

Field	Type	Null	Key	Default	Extra
patientno	int<11>	NO	PRI	NULL	
Name	varchar<30>	NO		NULL	
Address	varchar<50>	NO		NULL	
Contact	int<10>	NO		NULL	
bloodgroup	varchar<5>	NO		NULL	
History	varchar<50>	NO		NULL	
Dob	date	NO		NULL	
Current	varchar<20>	NO		NULL	
Roomno	varchar<10>	NO		NULL	
dateadd	date	NO		NULL	
Rtype	varchar<10>	NO		NULL	
Gender	varchar<10>	NO		NULL	
Did	int<11>	NO	MUL	NULL	

V. RESULTS

- The hospital data entry operator is able to successfully-
 - Login to the system through the first page of the application.

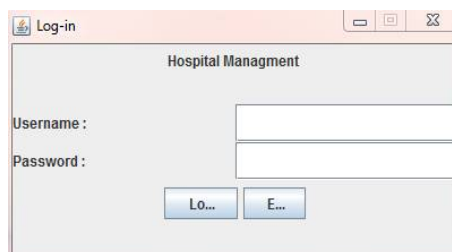


Fig.1 Login screen

- Insert, modify and retrieve patient's related data. It includes-
 - Personal information
 - Name



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- Gender
- Address
- Patient No.
- Room No.
- Contact
- Date of Admission
- Medical information
 - Blood group
 - Date of birth
 - Medical history
 - Current problem
 - Type of room
 - Attending doctor ID

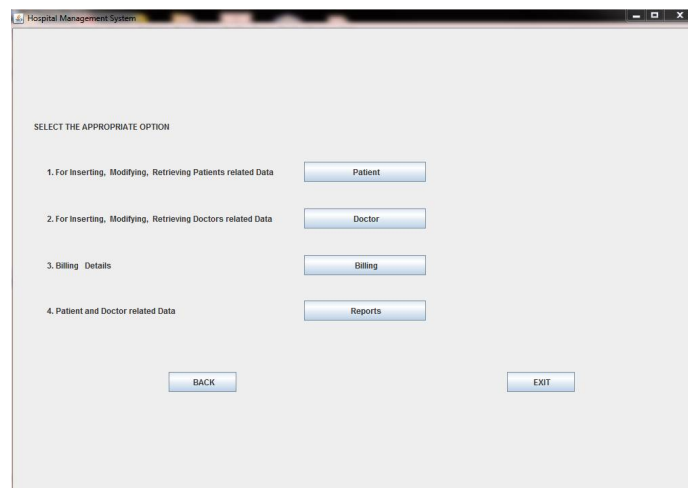


Fig.2 Screen for selecting appropriate option

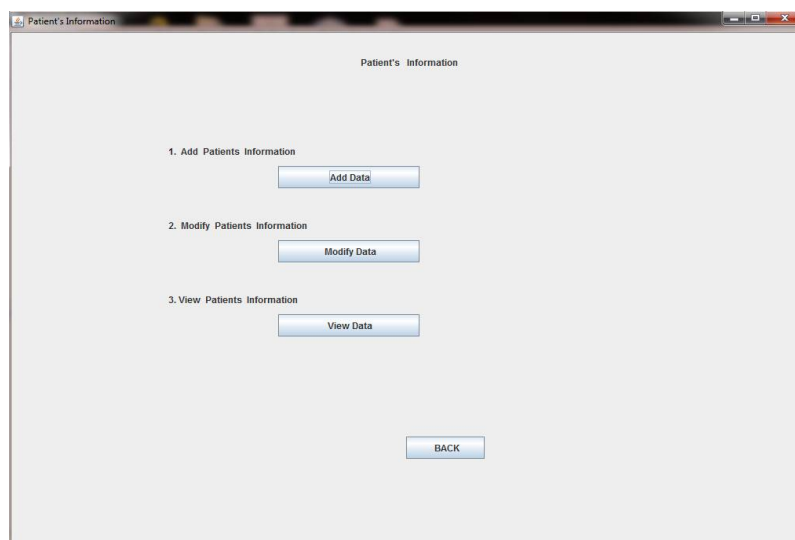


Fig.3 Screen for selecting appropriate option

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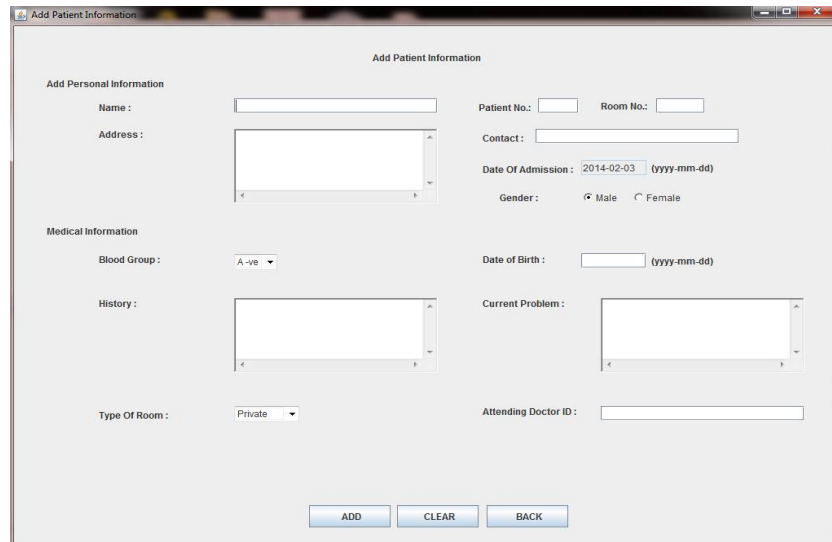


Fig.4 Screen for adding patient's related information

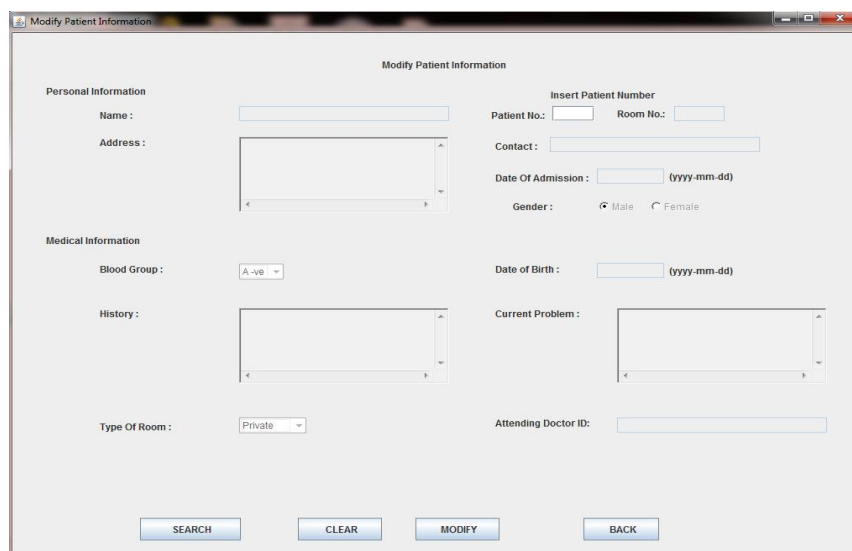


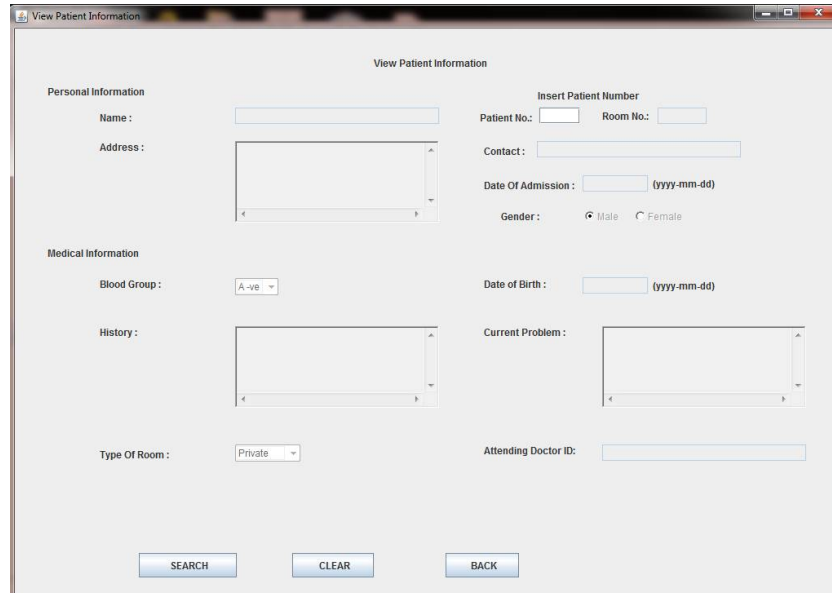
Fig.5 Screen for modifying patient's related information

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The screenshot shows a web application window titled "View Patient Information". The interface is divided into two main sections: "Personal Information" and "Medical Information".

Personal Information:

- Name:
- Address:
- Insert Patient Number: Patient No.: Room No.:
- Contact:
- Date Of Admission: (yyyy-mm-dd)
- Gender: Male Female

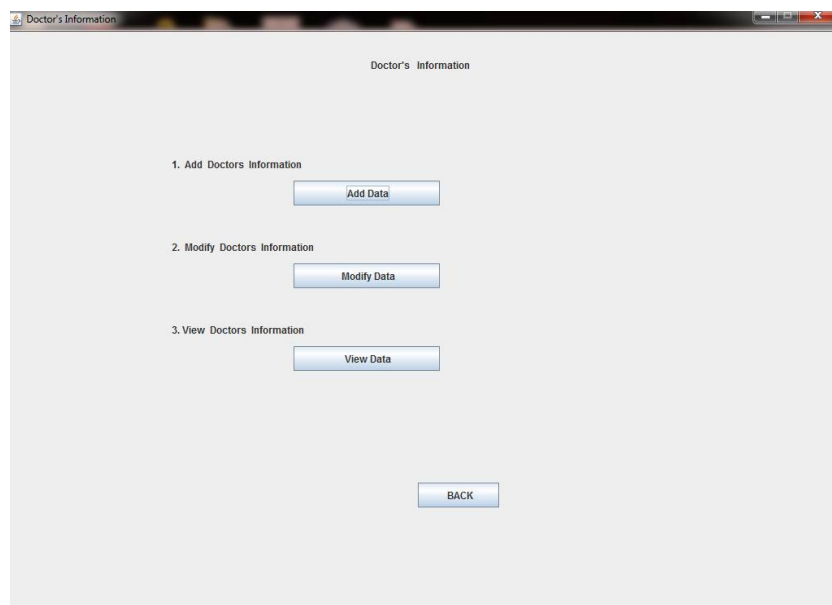
Medical Information:

- Blood Group:
- Date of Birth: (yyyy-mm-dd)
- History:
- Current Problem:
- Type Of Room:
- Attending Doctor ID:

At the bottom of the form, there are three buttons: "SEARCH", "CLEAR", and "BACK".

Fig.6 Screen for viewing patient's related information

- Insert, modify and retrieve doctor's related data. It includes-
 - Doctor's information
 - Name
 - Doctor ID
 - Address
 - Contact
 - Specialization
 - Working hours



The screenshot shows a web application window titled "Doctor's Information". The interface is simple and contains three main options for managing doctor data:

1. Add Doctors Information
2. Modify Doctors Information
3. View Doctors Information

At the bottom of the page, there is a "BACK" button.

Fig.7 Screen for selecting appropriate option



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Doctor Information

Doctor Information

Name : Doctor ID:

Address :

Contact :

Specialization :

Working hours : From: to:

ADD CLEAR BACK

Fig.8 Screen for adding doctor's related information

Doctor Information

Doctor Information

Name : Doctor ID:

Address :

Contact :

Specialization :

Working hours : From: to:

SEARCH CLEAR MODIFY BACK

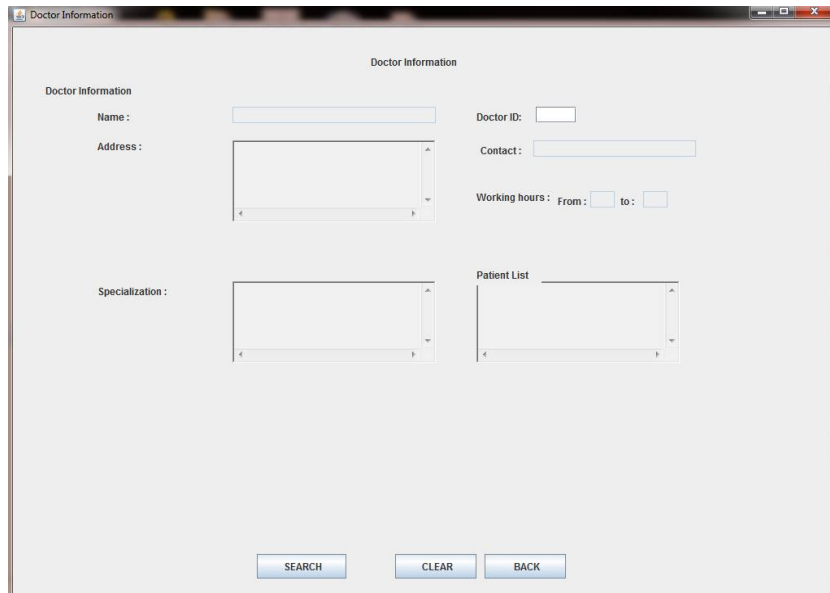
Fig.9 Screen for modifying doctor's related information

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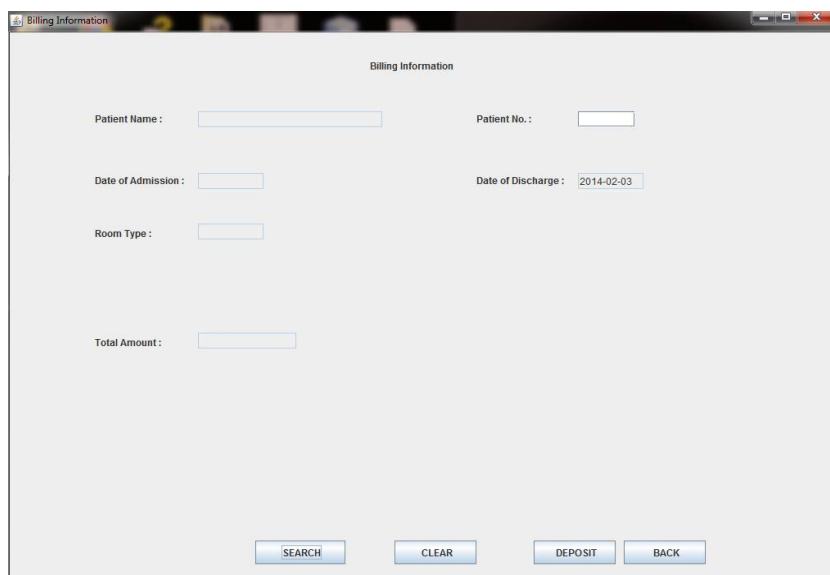
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The screenshot shows a web application window titled "Doctor Information". The form contains the following fields: "Name" (text input), "Address" (text area), "Specialization" (text area), "Doctor ID" (text input), "Contact" (text input), and "Working hours" (two text inputs for "From" and "to"). There is also a "Patient List" table with a header and a scrollable area. At the bottom, there are three buttons: "SEARCH", "CLEAR", and "BACK".

Fig.10 Screen for viewing doctor's related information

- Maintain the record of the bills of the patients. It includes-
 - Patient's name
 - Date of Admission
 - Date of Discharge
 - Room Type
 - Total Amount.



The screenshot shows a web application window titled "Billing Information". The form contains the following fields: "Patient Name" (text input), "Patient No." (text input), "Date of Admission" (text input), "Date of Discharge" (text input with the value "2014-02-03"), "Room Type" (text input), and "Total Amount" (text input). At the bottom, there are four buttons: "SEARCH", "CLEAR", "DEPOSIT", and "BACK".

Fig.11 Screen for showing patient's billing information

2. Doctors can use the application to have information about the patients admitted.
3. Chief medical officer can also have an access to the application, if all computers have been connected through a computer network (e.g.: LAN).



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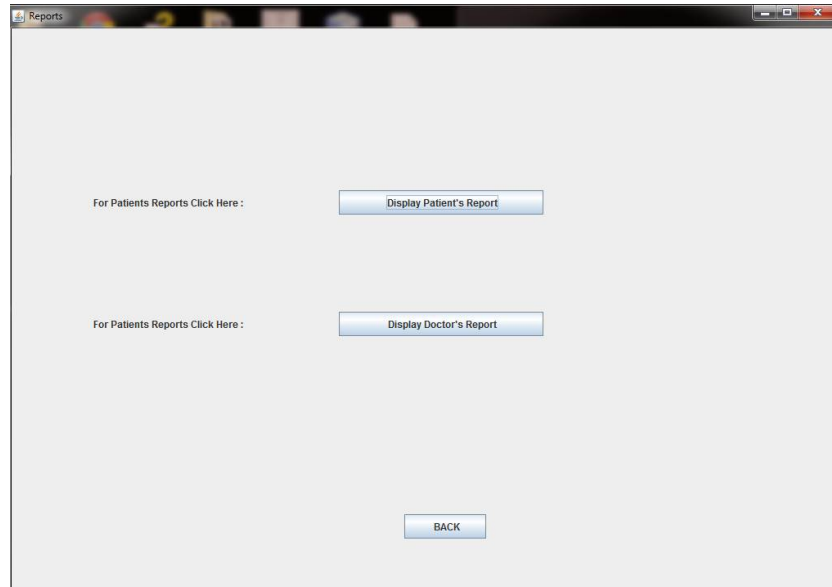


Fig.12 Screen for selecting appropriate option

did	name	address	contact	specialization	workfrom	workto
1	Dr.Rajendra Varshney	Mithraj Hospital	100201	Radiology	8	20
10	Dr.Mihlesh Varshney	Mithraj Hospital	100202	Gynaecology	8	22
20	Dr.Sandeep Kumar	Mithraj Hospital	100301	Paediatrics	9	12
30	Dr.Mohd.Zia Siddiqui	Mithraj Hospital	100203	General Surgery	9	17
40	Dr.Gyan Varshney	Mithraj Hospital	100206	Orthopedics	10	16
50	Dr.Jamal Ahmad	Mithraj Hospital	100302	Medicine	9	17
60	Dr.Girish Sharma	Mithraj Hospital	100401	Urology	17	20
70	Dr.Kruti Varshney	Mithraj Hospital	100207	Microbiology	8	16
80	Dr.Shruti Varshney	Mithraj Hospital	100205	Dental Surgery	9	17
90	Dr.Kausar Siddiqui	Mithraj Hospital	100402	Ophthalmology	10	15

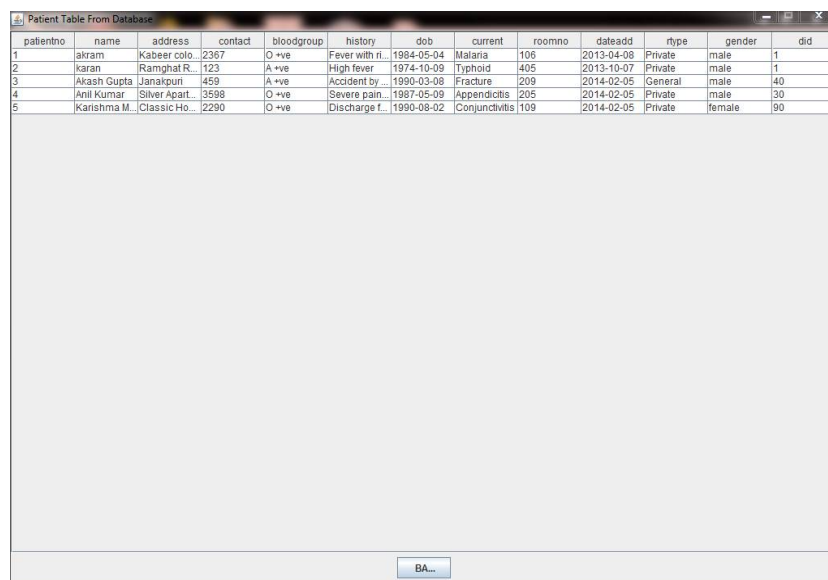
Fig.13 Screen for displaying doctor's table from the database

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patientno	name	address	contact	bloodgroup	history	dob	current	roomno	dateadd	rtype	gender	did
1	akram	Kabeer colo	2367	O +ve	Fever with ri...	1984-05-04	Malaria	106	2013-04-08	Private	male	1
2	karan	Ramghat R...	123	A +ve	High fever	1974-10-09	Typhoid	405	2013-10-07	Private	male	1
3	Akash Gupta	Janakpuri	459	A +ve	Accident by ...	1990-03-08	Fracture	209	2014-02-05	General	male	40
4	Anil Kumar	Silver Apart...	3598	O +ve	Severe pain...	1987-05-09	Appendicitis	205	2014-02-05	Private	male	30
5	Karishma M...	Classic Ho...	2290	O +ve	Discharge f...	1990-08-02	Conjunctivitis	109	2014-02-05	Private	female	90

Fig.14 Screen for displaying patient's table from the database

VI. CONCLUSION

The vast amount of data collected and manipulated on a daily basis is an integral part of the functioning of the modern healthcare industry. Proper channelling and a better structured model is required with efficient data management techniques to make sure the entire process churns out ample time that is much needed for providing quicker healthcare facilities.

The desktop application that I have developed can successfully eliminate some of the problems that materialize due to irresponsible and inefficient data management techniques used in earlier healthcare facilities. This application can be used to strengthen and reinforce the future healthcare industries to increase their overall efficiency by effective management of their database dynamically, helping them take a step forward into the development and advancement of commercial healthcare services.

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BIOGRAPHY

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