

Health Care Monitoring System



Final Year Project

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In the name of Allah the beneficent the merciful

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Finally, we thank our parents for supporting us throughout all our studies at University.

CERTIFICATE

We accept the work contained in this report as a confirmation to the required standard for the partial fulfillment of the degree.

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In the name of Allah (SWT) the most beneficent and the most merciful.

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CHAPTER # 1

Introduction

This chapter describes a brief introduction to our project.

1.1 Introduction

Health Care Monitoring System (HCMS) is the software to automate the monitoring system of hospital. It gives the way of patient's care without visiting his/her bed. This is the software for hospital that can maintain the records based upon event based notification system. Intelligent agents are implemented in the software that makes the software more efficient.

1.2 Problem Description

There is traditional local area network setup in a hospital. All the beds in different wards have a physiological sensors attached to them. When a bed is occupied by a patient we will connect the sensors to the patient and these sensors will collect data like blood pressure, e.c.g, pulse rate, glucose, and temperature etcetera. There is an application installed on a doctor's computer on which he can view all this data of any patient on his screen. This way the doctor is able to constantly monitor all his patients while sitting at the same spot and not having to move around. The application is also generating alarms and warnings to the doctors when some patient's readings go above or below a certain level. This system keeps a statistical record of a patient's readings for later analysis. This system also provides the functionality to print reports.

With the help of this system we are able to enhance the efficiency of doctors without having them do any extra work instead doctors are at more ease.

Warning about a patients worrying situation will be generated at once and will come under notice at once instead of a doctor roaming around wards and nurses giving periodic check visits to patients.

History of a patients reading is available for a better analysis and as a proof in unfortunate or suspicious cases.

1.3 Objective

To create software for hospital, that collects physiological data of patient. This display is available to nurse and doctor. Doctor can also see patient registered to him from his panel.

Our basic motive was to automate the monitoring of Hospitalin an efficient way and to provide accurate information to the doctors and nurses. The main features of our software are as follows:

1.3.1 Monitoring System

Our aim is to monitor the patients in the ward. We have developed a system that monitors the patients and displays the following parameters of each patient

- Live Video
- Blood Pressure
- Temperature
- Heart Rate

1.3.2 Alerts and Notification System

We have introduced intelligent agents, Alerts and Notification system in our project that monitor the patient's health record in efficient way and responds to the users in the form of notifications and alarms.

1.4 Scope

This section tells you the scope of our project (HCMS). (HCMS) will require some studies in the field of medicine and medicine technology to understand how physiological sensors work and how to integrate them into our system. We have done a survey with doctors and medicine experts to find out what kind of data from patients they constantly need and the special cases for which they need special data or processed data.

(HCMS) monitor the patient's physiological data remotely. There is central database on the server, where all the information like accounts information of the users and registration information of patient.

Users who connected are acting as a client and can access the database and use it for their purposes e.g doctor can see the history of patient where in history all the fields come from the data base.

Our system is divided into two developing parts. One part is the data acquisition in which we captured the live video through iConf SDK that is used in monitoring panel.

iConf create video conferencing applications easily, or add video/audio/text conferencing capabilities to the application, with this easy to use SDK for the .NET framework . This SDK will prove to be our solution to all issues related to developing a comprehensive video application using Visual Studio.NET. [1]

Video encoding/decoding is done using iConf's licensed H.263/H.264 codecs which are built into the SDK. Audio conferencing uses the SPEEX codec. To facilitate communication behind NATs and firewalls, the iConf .NET SDK is bundled with the Central Server .NET Windows Service that acts as a directory service for the iConf Client/Server .NET components.[1]

The Central Server is necessary when communication needs to occur between parties that have private IP addresses internal to a local area network that are inaccessible to the outside world, or that have ports blocked by a firewall.[1]

Here are some key features of "iConf.NET SDK":

- Each iConf Server .NET component can stream video, audio, text data to multiple clients
- Support for DirectX compatible video capture devices and webcams
- Adjustable H.263 and H.264 parameters
- Configurable communication ports
- Support for connection monitoring and more [1]

Other part is software, which have the following features

- Intelligent Agents
- History
- Event Notification
- Web based Panel for doctor, Nurse, Receptionist and Administrator
- Centralized data base
- Saving record for each patient
- Live video of patient
- Alarms
- Medical Therapy(medicine prescription ,daily dosage)
- Reports
- Logs
- Printing facility

Through this software we are able to view data of one or more patient in monitoring panel.

1.5 Project Phases

There are following phases of our project

1.5.1 System design on the basis of analysis

1st off all we made consistent and user friendly design of system. Also describe all software required to support the system for database, operating systems.

1.5.2 Data base design

Tables are designed for our system and relationships are defined, which describe in detail the system's communications network, i.e. how system components are linked.

1.5.3 Development

We have developed user friendly interface and back end functionality in .Net C#. For data base we used SQL to store data and we have installed data base on server so every user can access the data base.

Crystal Reports is used for reporting purpose.

1.5.4 Implementation

We have installed our data base on server and client on two separate computers

1.5.5 Testing

Before implementation we have tested our software by integration testing and unit testing. After implementation we have performed black box and white box testing on our software.

CHAPTER # 2

SYSTEM OVERVIEW

This chapter provides an overview of Health care monitoring system development.

2.1 Target organization

Our system is not developed for any specific hospital. It can be used by any hospital for remote monitoring of patient.

System design is expandable because we developed it as a network system. This allowed the monitoring and the management services to be available remotely.

2.2 Software Development Process Model

“A software development process is a structure imposed on the development of a software product. Synonyms include software life cycle and software process. There are several models for such processes, each describing approaches to a variety of tasks or activities that take place during the process.”[2]

The software process model that we have chosen to develop our system is the spiral model. A standard definition of the spiral process model and the steps involved in spiral process model are addressed in the following two paragraphs.

“The spiral model is a software development process combining elements of both design and prototyping-in-stages, in an effort to combine advantages of top-down and bottom-up concepts. Also known as the spiral lifecycle model (or spiral development), it is a systems development method (SDM) used in information technology (IT). This model of development combines the features of the prototyping model and the waterfall model. The spiral model is intended for large, expensive and complicated projects.”[2]

The steps in the spiral model iteration can be generalized as follows:

The new system requirements are defined in as much detail as possible. This usually involves interviewing a number of users representing all the external or internal users and other aspects of the existing system. [2]

A preliminary design is created for the new system. This phase is the most important part of "Spiral Model". In this phase all possible (and available) alternatives, which can help in developing a cost effective project are analyzed and strategies are decided to use them. This phase has been added specially in order to identify and resolve all the possible risks in the project development. If risks indicate any kind of uncertainty in requirements, prototyping may be used to proceed with the available data and find out possible solution in order to deal with the potential changes in the requirements. [2]

A first prototype of the new system is constructed from the preliminary design. This is usually a scaled-down system, and represents an approximation of the characteristics of the final product. [2]

A second prototype is evolved by a fourfold procedure:

- Evaluating the first prototype in terms of its strengths, weaknesses, and risks.
- Defining the requirements of the second prototype.
- Planning and designing the second prototype.
- Constructing and testing the second prototype.[2]

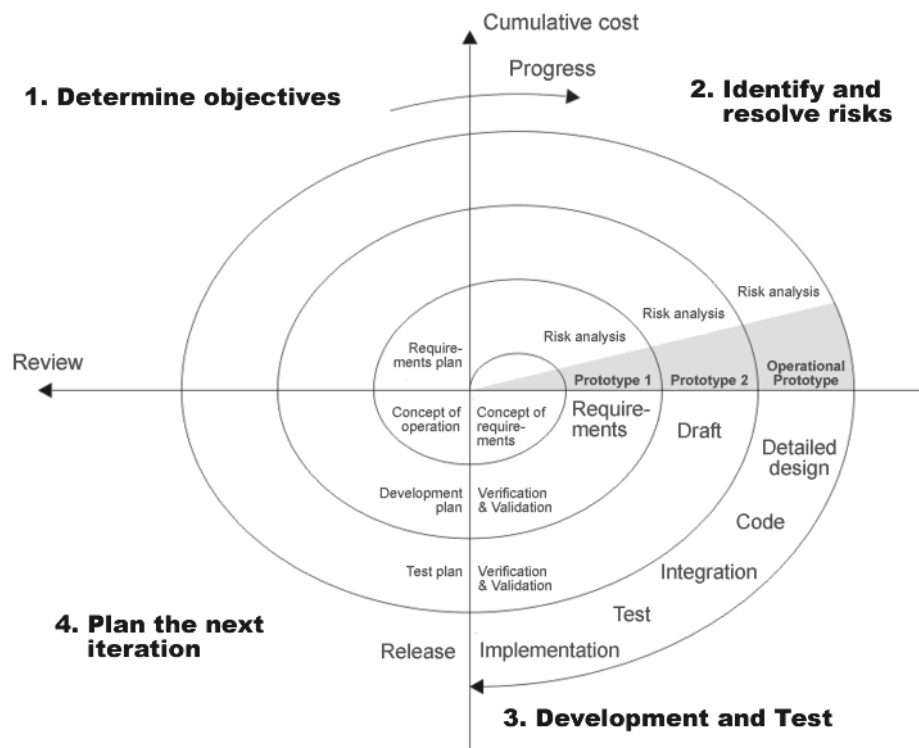


FIG: 2.3.1 - A Representation of Spiral Process Model[2]

For Development spiral model best suits our project.

- To develop the system first off all we made consistent and user friendly design of system. Then we have made the basic interface of the system on the basis of that.
- After that we have designed the database and implemented it with the basic design of our system and checked database working with that basic design.
- Basic interface collect the stored readings from the database and display them on the screen then we developed the real interface on the basis of that then we added tables and defined relationships in the data base.
- At every stage of updatation of data base we tested the system for proper working.

We worked on the basis of spiral model tips of designing, implementation, testing, reviewing and then again designing until it full fill all the requirements.

From above points it is clearly seen that the spiral process model is very suitable for our system because the system is a mesh of databases, user friendly interfaces, real time services and network programming. If we selected other process model, then system can be build but the system could become complicated.

So due to this we have selected spiral spinning in all the phases like design, development and testing processes. Our system design is very simple and easy to understand by any person.

2.3 System Users

Users who are involved in using system are given in the following.

- System Administrators

- Receptionists
- Nurses
- Doctors

All of these users have some functionality to perform.

2.4 Role of Users in Their panels in system

2.4.1 System Administrators

System Administrator is the prime user of the system. One of the main responsibilities of the system Administrator is to create accounts of doctors, nurses and receptionists. By that they all can access system with their login user name and password. All of this is just for authentication.

The system Administrator can also delete the accounts of doctor, nurse and receptionist by selecting user id. The Administrator can change and update the data base.

The Administrator can view the daily log which shows that how many users are sign in and sign out with time and date.

Administrator can also see the patients admitted in hospital and available doctors.

So all back end handling of system is managed by Administrator.

2.4.2 Receptionist

In hospital patients who come to hospital for admission, first he/she is received by receptionist. Receptionist can register patient on the basis of online doctors and bed vacant displayed to him in his panel. After registration patient will be admitted.

He/she can also discharge patient by entering user id, but before patient discharge, system will ask for entering the pin code assigned to receptionist for authentication.

If he/she will not enter the correct code so system will deny discharging the patient.

He/she can also change his password from his/her panel.

2.4.3 Nurse

The next user is the nurse. A nurse is allowed to appoint the patient to online doctor who is registered by receptionist from reception panel. Nurse also sees the upcoming medicine times of patient from her panel then she can view the prescription detail available and she asks another nurse to visit the patient and give him/her medicine.

Upcoming medicine times are prompted according to the schedule of the patient's dosage which is scheduled for morning, noon, and evening.

She check the monitoring panel from where she can see patient's live video and health record coming from ward. There is blood pressure, temperature and pulse rate in health record.

Intelligent agent is added that is periodically checking the recent data of all the patients and Display the patient's Health status. It also generates alarms in the form of message in any emergency of the patient.

There is an option of bed in nurse panel from where she can see the condition of patient in the way

- if color of bed is blinking in red and green it means there is critical condition of patient on that bed
- if color of bed is blinking in blue and green it means patient needs medicines
- if color of bed is green it means everything is all right with the patient

She can also change her password from her panel.

2.4.4 Doctor

The doctor is the last user of our software. Doctor has the services in his panel that tells the doctor about upcoming appointments appointed by the nurse. In this way the doctor is able to manage his appointments.

Doctor can see the patient's detail by seeing his history. He can also see the live video and health record of his patient. And doctor is also be able to perform general functions like change password.

CHAPTER # 3

Requirement Analysis

Our basic requirement was to monitor a patient in the ward. To achieve this motive we have to go through from the following steps.

3.1 Patient Registration System

Patient must be registered first for admission in ward. For this purpose we must registered the patient.

First we will discuss why it is necessary to keep record of the patients admitted to the ward?

Physiological readings of patient coming from the monitoring panel will display so It is a very important that the readings must point to a particular patient. For that purpose some of the information of the patient must be coming in the monitoring panel from his registration e.g patient name, age, gender etc because it is difficult for the doctor, nurse or any other staff member to remember all the time that which bed is assigned to which patient.

So it is important that the bed number assigned to the patient will have to be fed into the system.

The information that the registration system will be keeping includes

- Admission date
- Patient name
- Mother name
- Age
- Gender
- Address
- NIC
- Phone no
- Marital status
- Name of next of kin
- Phone of next of kin
- Medical history
- Present disease
- Injuries/ surgeries
- Blood pressure
- Temperature

- Weight
- Height
- Bed Allocated
- Doctor Assign
- Any other medical condition

Some other question must be filled by the patient in registration form whose answer will be in the form of “Yes” or “No”, which are

- Do you Drink alcohol
- Do you smoke
- Fever
- Runny nose
- Chronic cough
- Dry throat
- Asthma
- Heart pain
- High blood pressure
- Low blood pressure
- Diarrhea
- Constipation
- Joint/ muscle pain
- Anemia
- Bleeding problem

3.2 Patient Discharge

After treatment completion when patient will be discharged, there must be a mechanism in system to discharge a patient by entering patient id.

3.3 Patients Appointment management

After patient registration, patient must be appointed to doctor on the basis of availability of doctor.

This automated appointment system will facilitate the doctors in their daily work. That system will give an interface to doctor to see all upcoming appointments in which he/she can see the patient id with time of

appointment. By keeping track of all the upcoming appointments, doctor can easily manage the time for appointment.

So there must be a system of patient appointments.

3.4 Upcoming Medicine time management

There must be system for Nurse to the upcoming medicine times of patient from her available system interface so for that she must have the prescription detail available on the interface given to nurse.

3.5 Upcoming medicine times notification management (Medical Therapy)

Upcoming medicine must be prompted to nurse according to the schedule of the patient's dosage which will be scheduled for morning, noon, evening and night.

3.6 Monitoring Panel

There must be a monitoring panel for nurse from where she can see patient's live video and health record coming from ward. Through that nurse can see the abnormality from monitoring panel.

3.7 Intelligent agent management

Intelligent agent must be added that will periodically check the recent data of all the patients coming from ward and display normality or abnormality of the patient's Health

Health record consist of

- Pulse rate
- Blood pressure
- Temperature

3.8 Alarm system

System must generate alarms after the intelligent agent give notification of any kind of abnormality of the patient's health, checked by intelligent agent.

3.9 History of patient

System must allow the doctor to see the patient's detail by seeing his history.

History must consist of

- Patient name
- Age
- Gender
- Bed allotted
- Phone number
- Weight
- Height
- Blood Pressure
- Temperature
- Previous disease
- Present disease
- Previous Injuries/Surgeries
- Other medical condition

Doctor must know about that patient is alcoholic or smoker.

With the history doctor must also see the live video and health record of his patient.

3.10 Administrator panel

There must be a system Administrator from where Administrator can create account of doctors, nurses and receptionists for their access to the system with their login user name and password.

User name and password must be implemented for authentication purposes.

The system Administrator can only delete the doctor, nurse and receptionist account.

3.11 Log of system

The Administrator must view the daily log which will show that how many users are sign in and sign out with time and date.

Administrator can also see the report of patients admitted in hospital and available doctors.

3.12 Printing facility

Printing facility must be provided.

3.13 Common Functionalities

All users can change their passwords from their own end.

CHAPTER # 4

System Design

This chapter describes the actual flow of data of our overall system in graphical form.

4.1 Unified Modeling Language

Unified Modeling Language (UML) is a standardized general-purpose modeling language in the field of software engineering.

UML includes a set of graphical notation techniques to create visual models of software-intensive systems. [5]

Diagram that is necessary to understand our systems is

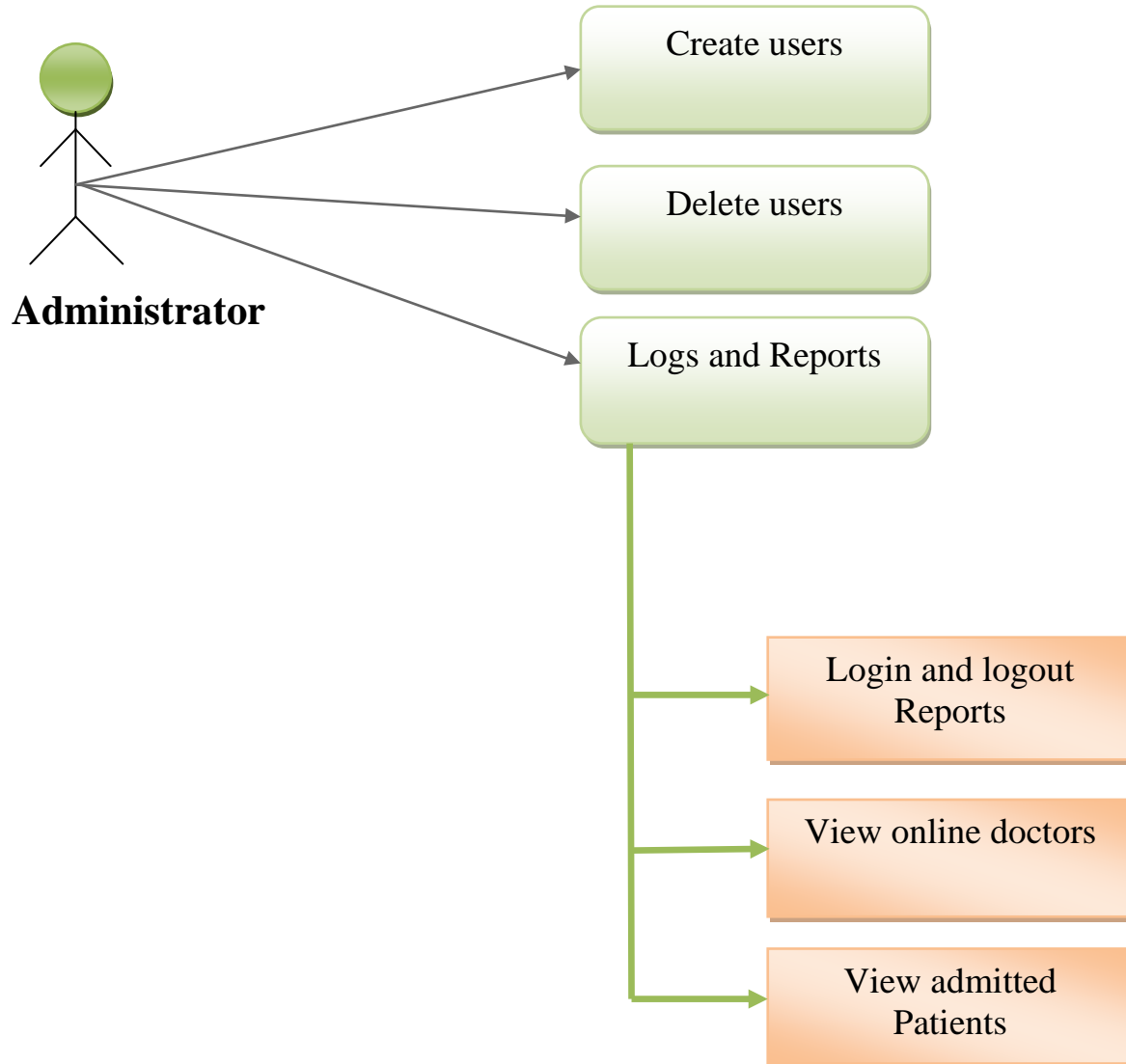
4.2 Use Case Diagram

“A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.” [6]

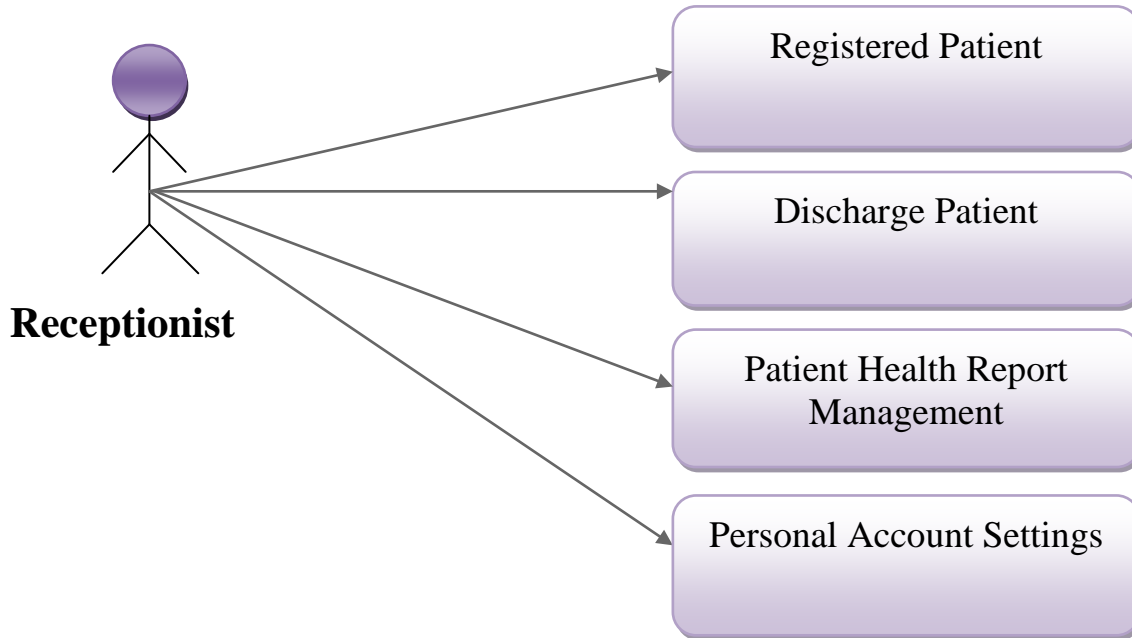
The following are the use cases of our system are

- Use case of Administrator
- Use Case of Receptionist
- Use case of Nurse
- Use Case of Doctor

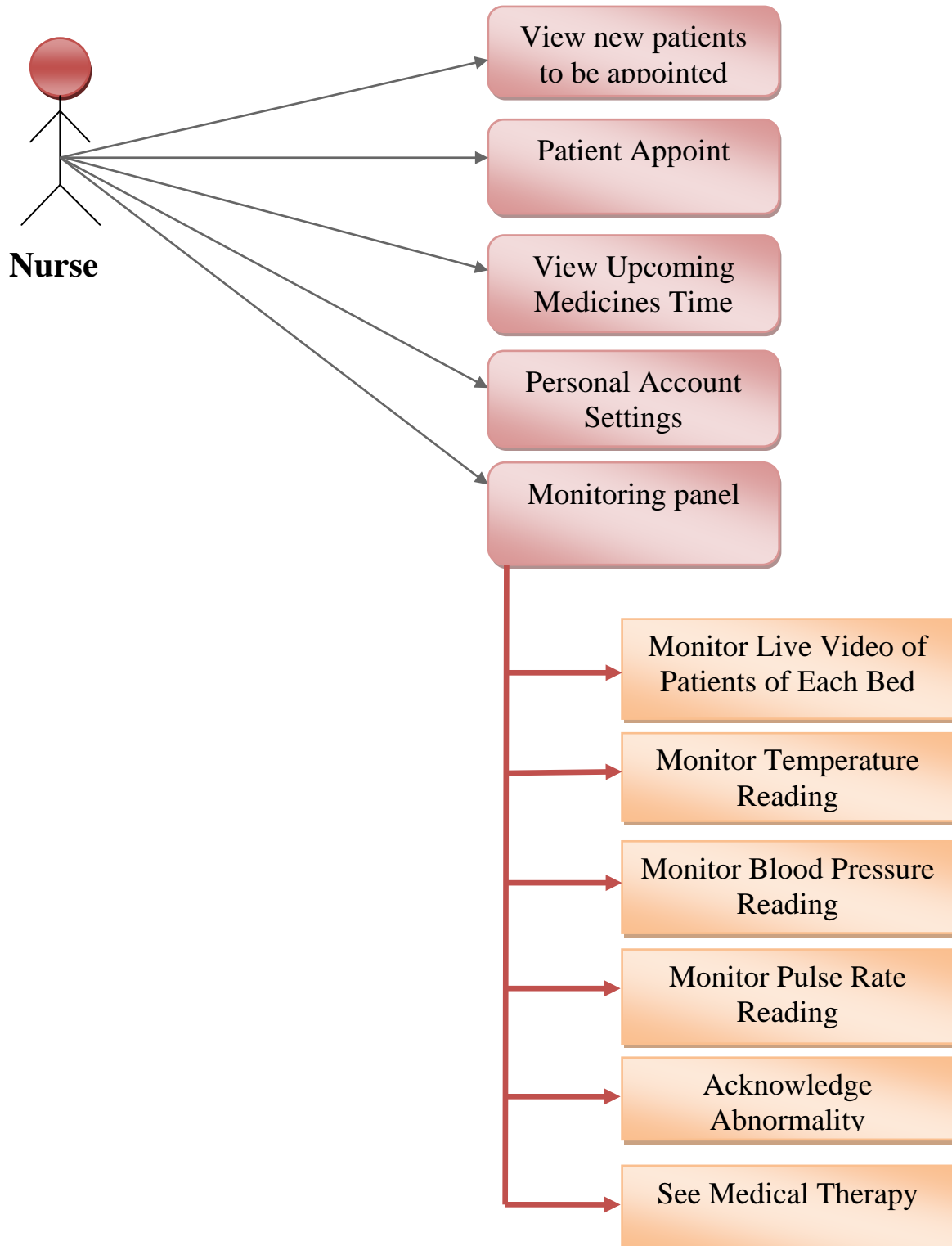
4.2.1 Use case of Administrator



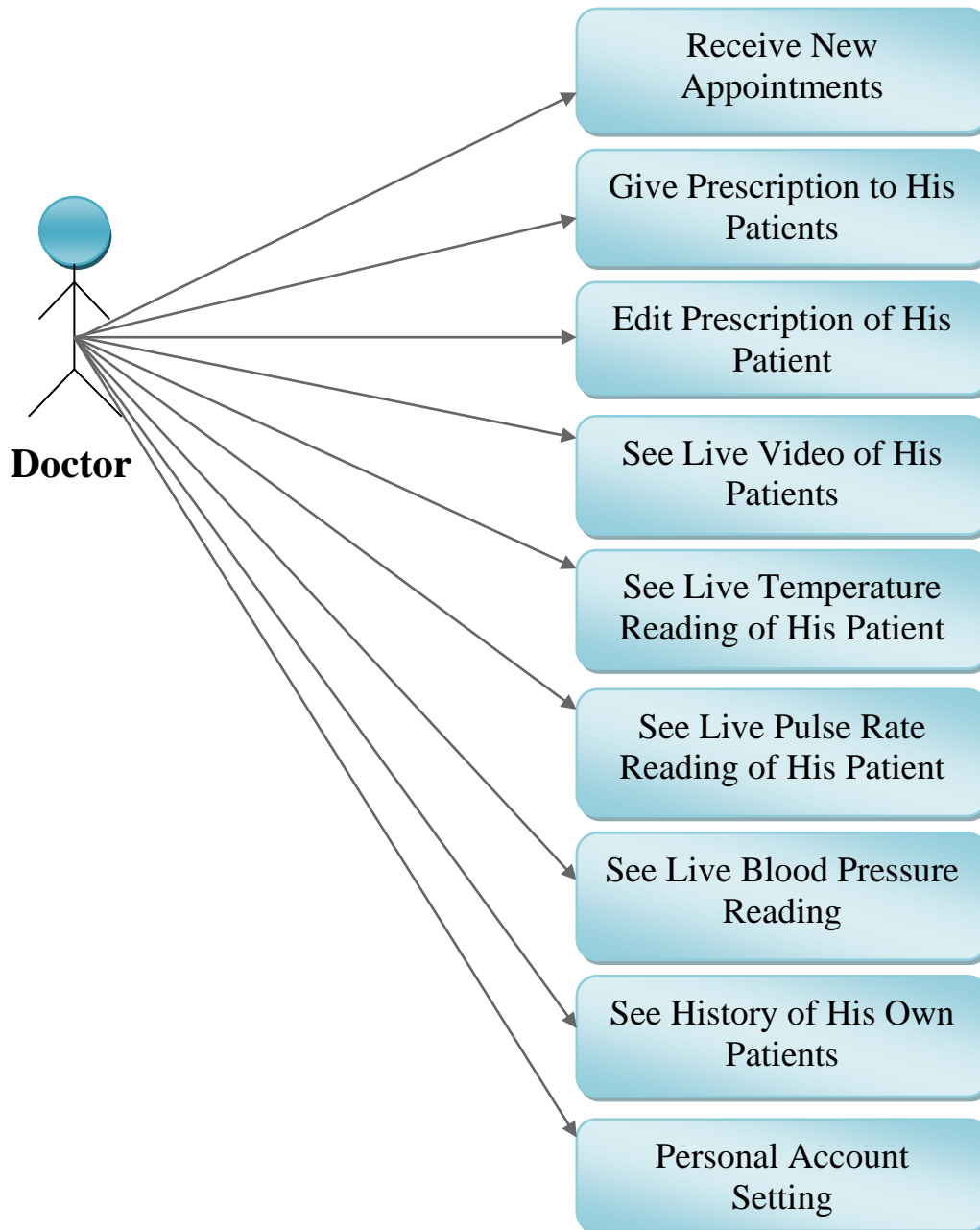
4.2.2 Use Case of Receptionist



4.2.3 Use case of Nurse

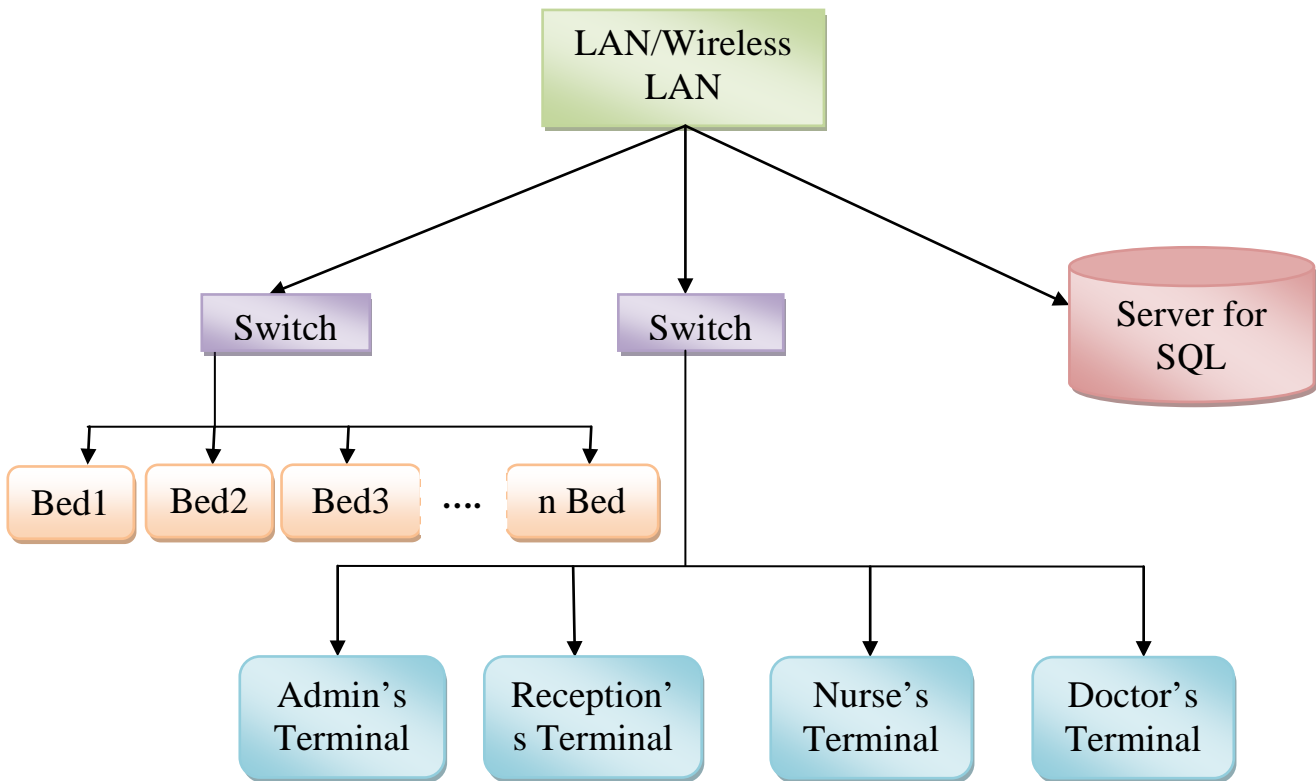


4.2.4 Use Case of Doctor



4.3 Deployment Diagram

We have deployed our system by the following sequence shown in diagram



4.4 Database Design

The schema of the tables of the database is given below.

Table Name: **Administrator**

Attribute Name	Data Type	Nulls Allowed	Key
a_id	varchar(15)	No	PK
a_name	varchar(10)	No	-
a_pass	varchar(50)	No	-
a_address	varchar(MAX)	No	-
a_phone	nchar(15)	No	-
a_sex	varchar(10)	No	-
a_age	nchar(15)	No	-

Table Name: **reception**

Attribute Name	Data Type	Nulls Allowed	Key
r_id	varchar(30)	No	PK
r_name	varchar(30)	No	-
r_pass	varchar(20)	No	-
r_pincode	varchar(20)	No	-
r_address	varchar(MAX)	No	-
r_phone	varchar(50)	No	-
r_age	varchar(3)	No	-
r_sex	varchar(6)	No	-
r_datereg	varchar(MAX)	No	-
r_nic	varchar(20)	Yes	-

Table Name: **Nurse**

Attribute Name	Data Type	Nulls Allowed	Key
n_id	varchar(10)	No	PK
n_name	varchar(50)	No	-
n_pass	varchar(10)	No	-
n_pin	varchar(50)	No	-
n_address	varchar(MAX)	No	-
n_phone	varchar(50)	No	-
n_age	varchar(3)	No	-
n_sex	varchar(6)	No	-
n_regdate	varchar(MAX)	No	-
n_nic	varchar(20)	No	-
n_status	varchar(10)	No	-

Table Name: **doctor**

Attribute Name	Data Type	Nulls Allowed	Key
d_id	varchar(10)	No	PK
d_name	varchar(50)	No	-
d_pass	varchar(10)	No	-
d_address	varchar(MAX)	No	-
d_phone	nchar(15)	No	-
d_age	varchar(3)	No	-
d_sex	varchar(6)	No	-
d_regdate	varchar(MAX)	No	-
d_nic	varchar(20)	No	-
d_status	varchar(10)	No	-
d_expertise	varchar(MAX)	No	-

Table Name: **patient**

Attribute Name	Data Type	Nulls Allowed	Key
p_id	varchar(10)	No	PK
p_name	varchar(50)	No	-
p_pass	varchar(10)	No	-
p_address	varchar(MAX)	No	-
p_phone	nchar(15)	No	-
p_age	varchar(3)	No	-
p_sex	varchar(6)	No	-
p_regdate	varchar(MAX)	No	-
p_nic	varchar(20)	Yes	-
p_nok	varchar(10)	No	-
d_nokphone	nchar(15)	No	-

p_nokphone	nchar(15)	
p_disease	varchar(MAX)	No
p_nic	nchar(15)	Yes
p_bedid	nchar(2)	No
p_docid	varchar(25)	No
p_date_addmission	varchar(40)	No
p_date_discharge	varchar(40)	Yes
p_med_history	varchar(MAX)	Yes
p_injur_sur	varchar(MAX)	Yes
p_alcoholic	varchar(5)	No
p_smoker	varchar(5)	No
p_alergy_hayfever	varchar(5)	No
p_runny_nose	varchar(5)	No
p_chronic_cough	varchar(5)	No
p_dry_throat	varchar(5)	No
p_asthma	varchar(5)	No
p_heart_pain	varchar(5)	No
p_h_bp	varchar(5)	No
p_l_bp	varchar(5)	No
p_diarrhea	varchar(5)	No
p_constipation	varchar(5)	No
p_joint_muscle_pain	varchar(5)	No
p_anemia	varchar(5)	No
p_bleeding_problems	varchar(5)	No
p_any_other_med_condit ion	varchar(MAX)	Yes
p_admitstatus	varchar(20)	Yes
med1	varchar(MAX)	Yes
med2	varchar(MAX)	Yes
med3	varchar(MAX)	Yes
med4	varchar(MAX)	Yes
med5	varchar(MAX)	Yes
med6	varchar(MAX)	Yes
med7	varchar(MAX)	Yes
med8	varchar(MAX)	Yes
med9	varchar(MAX)	Yes
med10	varchar(MAX)	Yes
medtime1	int	Yes
medtime2	int	Yes
medtime3	int	Yes
medtime4	int	Yes
medtime5	int	Yes
medtime6	int	Yes
medtime7	int	Yes

medtime8	int	Yes
medtime9	int	Yes
medtime10	int	Yes
p_temp	varchar(10)	No
p_height	varchar(10)	No
p_weight	varchar(10)	No
p_bp	varchar(50)	No
p_appoint_status	varchar(50)	Yes
med1status	varchar(10)	Yes
med2status	varchar(10)	Yes
med3status	varchar(10)	Yes
med4status	varchar(10)	Yes
med5status	varchar(10)	Yes
med6status	varchar(10)	Yes
med7status	varchar(10)	Yes
med8status	varchar(10)	Yes
med9status	varchar(10)	Yes
med10status	varchar(10)	Yes
Meddate	varchar(50)	Yes
p_nokphone	nchar(15)	No
p_disease	varchar(MAX)	No
p_nic	nchar(15)	Yes
p_bedid	nchar(2)	No
p_docid	varchar(25)	No
p_date_admission	varchar(40)	No
p_date_discharge	varchar(40)	Yes
p_med_history	varchar(MAX)	Yes
p_injur_sur	varchar(MAX)	Yes
p_alcoholic	varchar(5)	No
p_smoker	varchar(5)	No
p_allergy_hayfever	varchar(5)	No

Table Name: action

Attribute Name	Data Type	Nulls Allowed	Key
a_id	int	No	PK
p_id	varchar(50)	No	-
d_id	varchar(50)	No	-
d_name	varchar(50)	No	-
p_name	varchar(50)	No	-
a_date	varchar(50)	No	-

a_status	varchar(50)	No	-
a_time	varchar(50)	No	-
a_check	varchar(50)	No	-
a_add_pin	varchar(50)	No	

Table Name: appointments

Attribute Name	Data Type	Nulls Allowed	Key
a_id	int	No	PK
p_id	Varchar(20)	No	
d_id	Int	No	
d_name	int	No	
p_name	Varchar(13)	No	
a_date	Datetime	No	
a_status	char(1)	No	
a_time	Int	No	
a_check	datetime	No	
a_add_pin	varchar(50)	No	

Table Name: logdetail

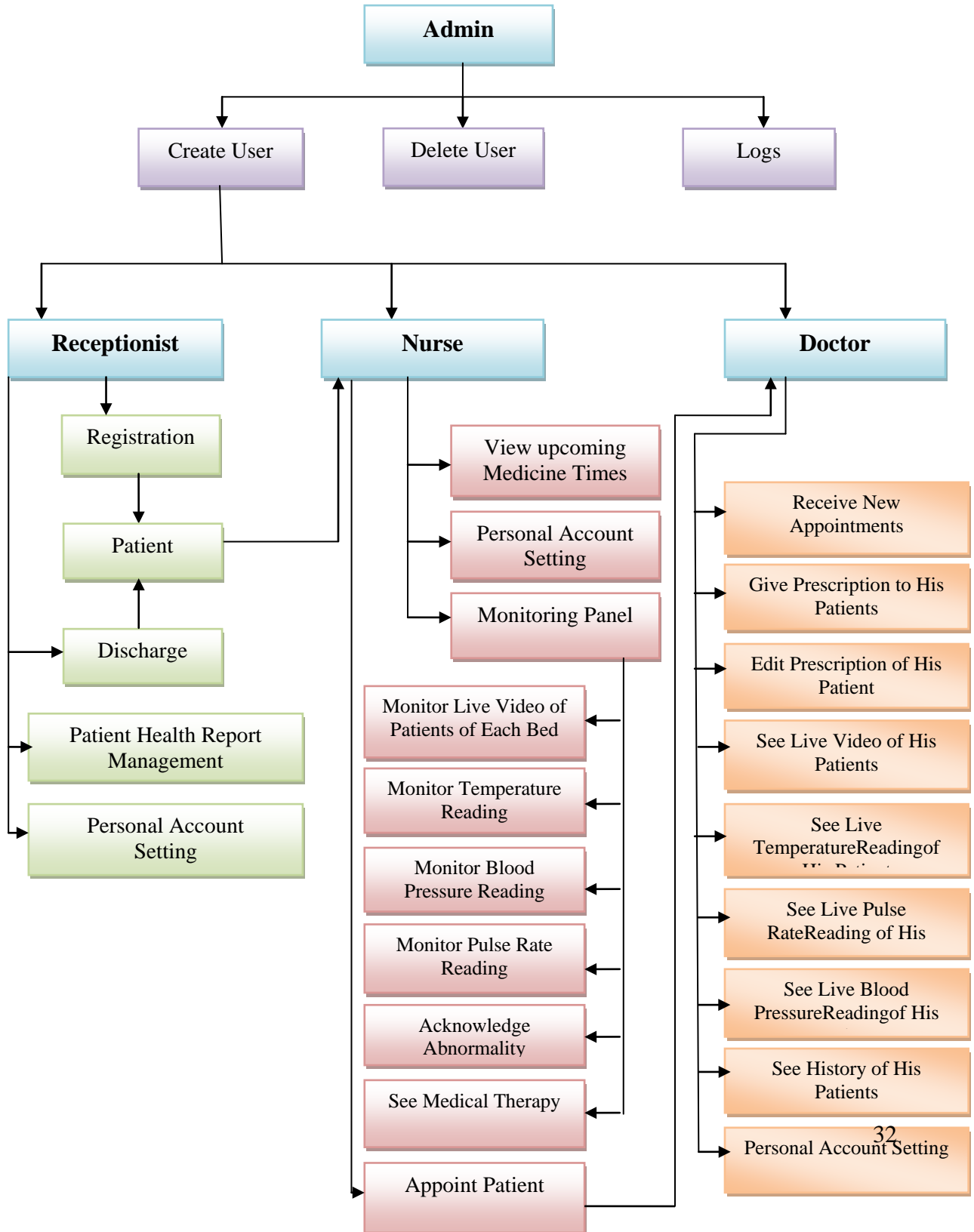
Attribute Name	Data Type	Nulls Allowed	Key
Srno	int	No	PK
Logname	varchar(50)	No	
Logdate	varchar(50)	No	
Logtime	varchar(50)	No	
Lodges	varchar(50)	No	
Logstatus	varchar(50)	No	

Table Name:**bed** (Tables of all beds are same as given below)

Attribute Name	Data Type	Nulls Allowed	Key
Id	int	No	PK
pulse_rate	int	No	
Temp	int	No	
Bpupper	int	No	
Bplower	int	No	

4.5 Data Flow Diagram

The data flow diagram of overall system is given below



CHAPTER # 5

Tools and Technologies

In this chapter explains the tools and technologies that have used in development of our system.

5.1 Visual Studio 8

The Microsoft .NET Framework is a software framework that can be installed on computers running Microsoft Windows operating systems. It includes a large library of coded solutions to common programming problems and a common language infrastructure that manages the execution of programs written specifically for the framework. The .NET Framework supports multiple programming languages in a manner that allows language interoperability, whereby each language can utilize code written in other languages; in particular, the .NET library is available to all the programming languages that .NET encompasses.

The framework's Base Class Library provides a large range of features including user interface, data access, database connectivity, cryptography, web application development, numeric algorithms, and network communications. The class library is used by programmers, who combine it with their own code to produce applications.

Programs written for the .NET Framework execute in a software environment that manages the program's runtime requirements. Also part of the .NET Framework, this runtime environment is known as the Common Language Runtime (CLR). The CLR provides the appearance of an application virtual machine so that programmers need not consider the capabilities of the specific CPU that will execute the program. The CLR also provides other important services such as security, memory management, and exception handling. The class library and the CLR together constitute the .NET Framework. [3]

For interface of our project we used visual studio 8. The front end is made in Visual C#. The system is compiled using Microsoft IDE Visual Studio 8. Visual studio 8 implements .NET 3.5, that's why system required .NET Framework 3.5 which support on a machine to run.

Basically we chose Microsoft Visual Studio because it provides an easy designing interface which saves much time in development as compared to C++, JAVA or any other language.

Figure # 5.1.1 illustrates Environment of Visual Studio 8.

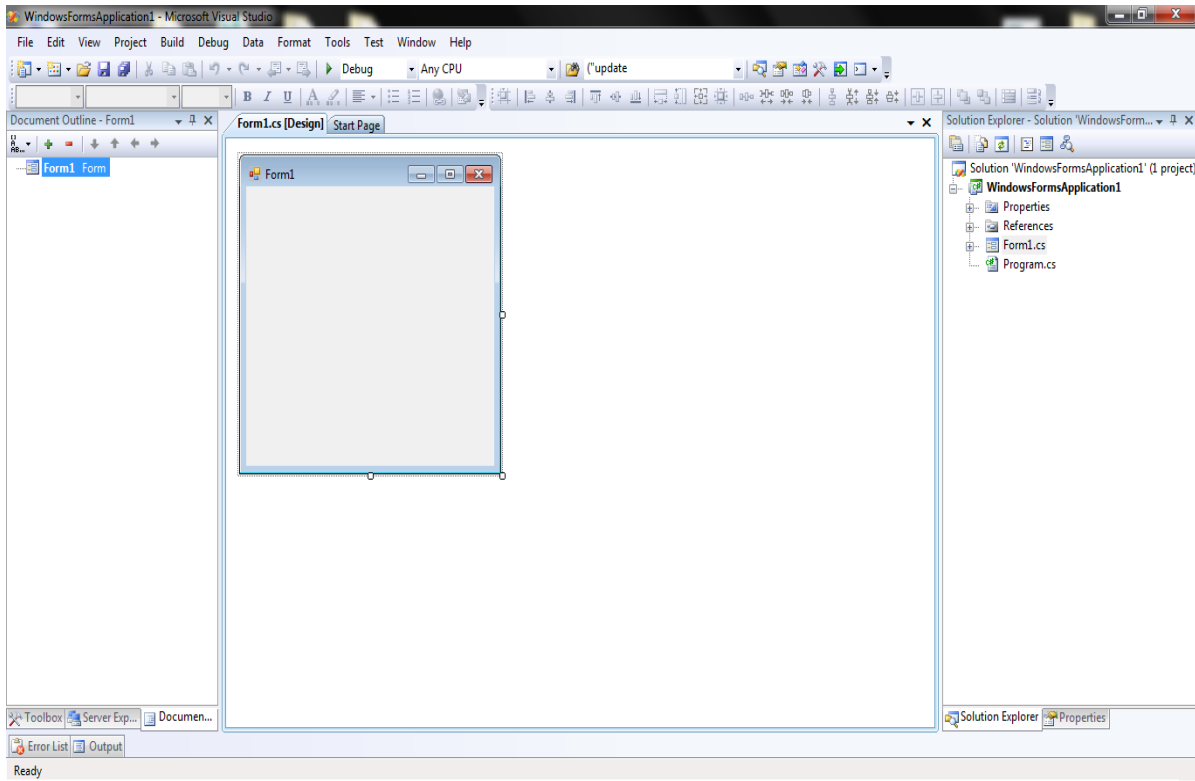


Fig 5.1.1 Environment of Visual Studio 8

5.2 Microsoft SQL Server

For relational database management system we chose Microsoft SQL Server Management studio Express Edition 2005.

SQL Server Management Studio is a tool included with Microsoft SQL Server 2005 and later versions for configuring, managing, and Administering all components within Microsoft SQL Server. The tool includes both script editors and graphical tools which work with objects and features of the server.[4]

A central feature of SQL Server Management Studio is the Object Explorer, which allows the user to browse, select, and act upon any of the objects within the server.[4]

Microsoft has also introduced a graphical configuration tool called SQL Server Management Studio Express (SSMSE) for SQL Server Express.[4]

As with all of Microsoft's "Express" products, this is downloadable as a standalone tool or integrated with a SQL Server Express edition at no charge. The tool's limitations lie in the fact that it cannot manage SQL Server Analysis Services, Integration Services, Notification Services, Reporting Services, or SQL Server 2005 Mobile Edition.[4]

SQL management studio is the principal database Administration portal for Microsoft SQL databases and many database Administrators spend a large percentage of time in the software to perform their job responsibilities. [4]



Fig 5.2.1 : Microsoft SQL Server

5.3 Microsoft Word for Data Flow and Diagrams

Another tool Microsoft word is used for all the data flow diagrams, database design and the entity relationship diagrams.

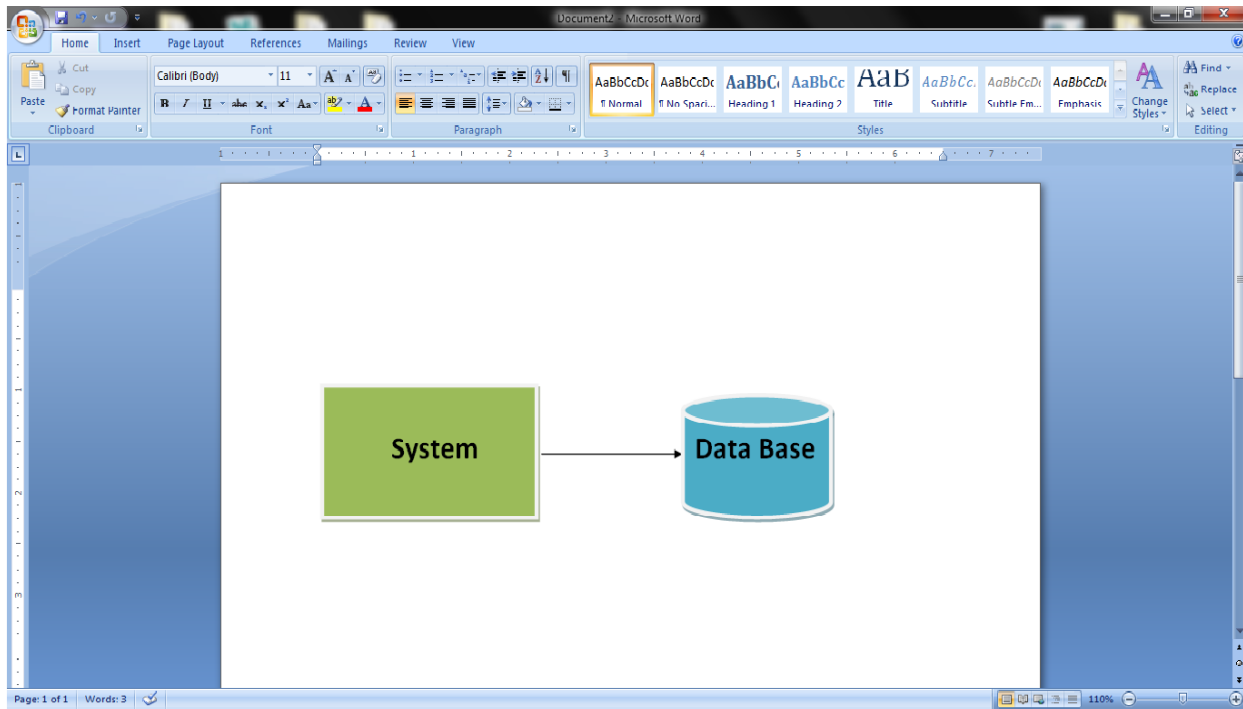


Fig 5.3.1 – Microsoft Word

5.4 Microsoft Word

For documentation, we used Microsoft word.

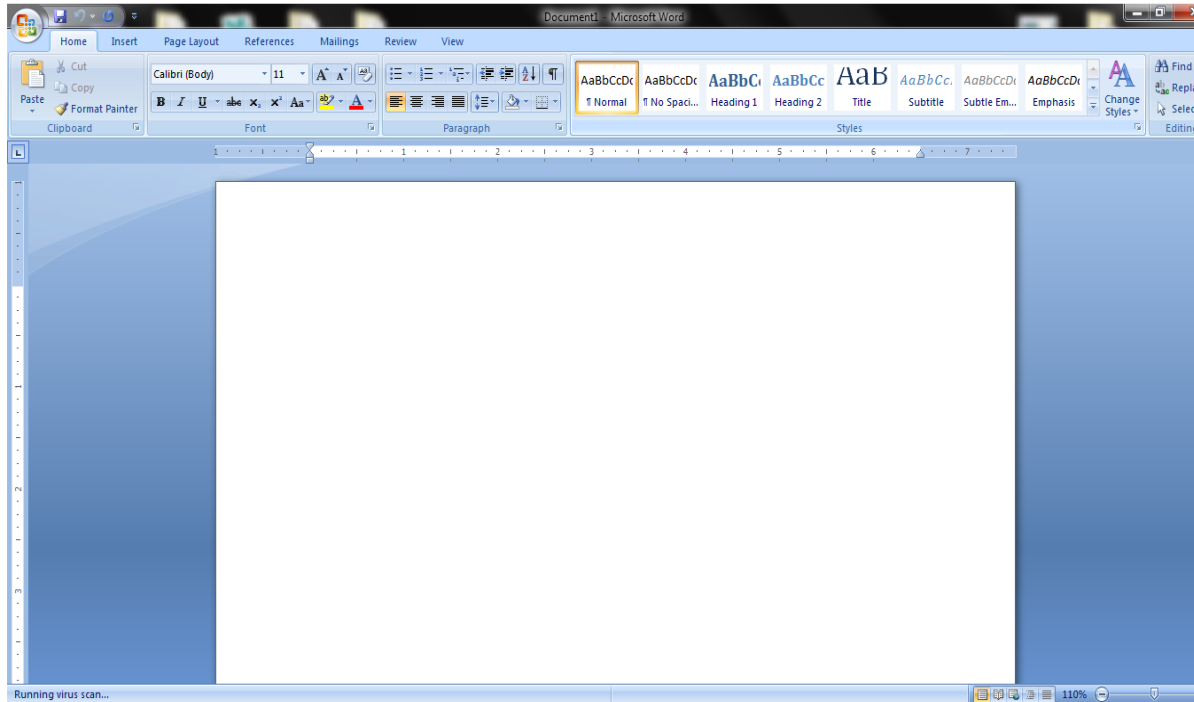


Fig 5.4.1 Microsoft Office Word

5.5 Adobe Photoshop

We used Adobe Photoshop 7.0 for the making images and icons that we used for designing of interface of our system.

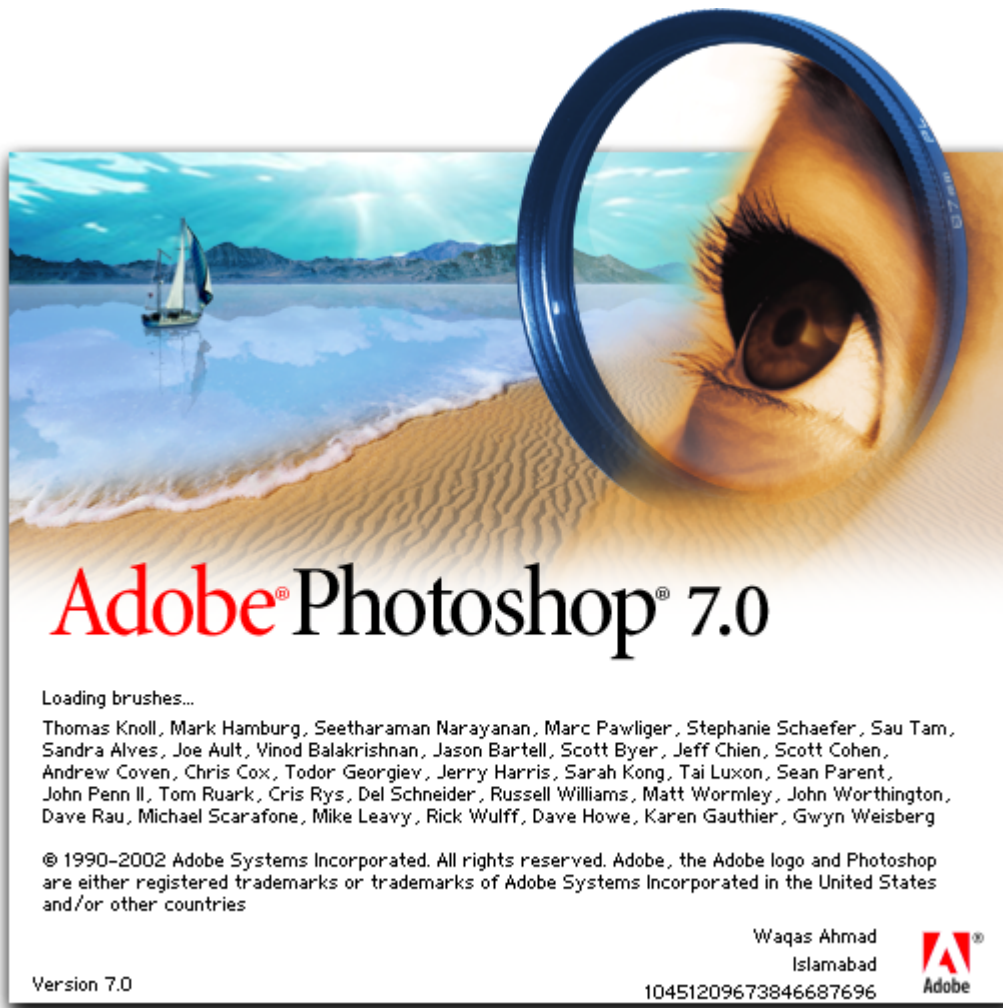


Fig 5.5 Adobe Photoshop 7.0

CHAPTER # 6

SYSTEM TESTING

6.1 Test Cases

In this chapter we have tested our software by the unit and integration testing method at the time of development. Errors were found and removed at the time of development. After development we have tested our software by black and white box testing methods and found the following results

We have recorded the testing results in the following table: -

Sr. No	Form Name	Action Performed	Expected Result	Observed Result	Remarks
1	Login	Login without username password	Unable to login error message will be populated	Error message is shown, unable to login	Ok
2	Login	Login with wrong password	Message will be populated that wrong username or password	Error message displayed	Ok
3	Login	Login with wrong username	Message will be populated that wrong username or password	Error message displayed	Ok
4	Login	Login with wrong designation	Message will be populated that wrong username or password	Error message displayed	Ok
5	Login	Login with correct receptionist account	Reception form should displayed	Receptionist form displayed	Ok
6	Login	Login with correct doctor account	Doctor form should displayed	Doctor form displayed	Ok

7	Login	Login with correct Nurse account	Nurse form should displayed	Nurse form displayed	Ok
8	Login	Login with correct Administrator account	Administrator form should displayed	Administrator form displayed	Ok
9	Login	Reset button pressed	Fields should be cleared	Fields were cleared	Ok
10	Login	Exit button pressed	Application will be closed	Application was closed	Ok
11	Login	X button pressed	Application will be closed	Application was closed	Ok
12	Administrator	View logs and reports	Log view should display	Log view displayed	Ok
13	Administrator	View all patient report	Report should display	Report displayed	Ok
14	Administrator	Print all patient report	Report should print	Report printed	Ok
15	Administrator	View all doctor report	Report should display	Report displayed	Ok
16	Administrator	Print all doctor report	Report should print	Report printed	Ok
17	Administrator	View full log report	Report should display	Report displayed	Ok
18	Administrator	Print full log report	Report should print	Report printed	Ok
19	Administrator	View daily log report by date	Report should display	Report displayed	Ok

20	Administrator	Print daily log report by date	Report should print	Report printed	Ok
21	Administrator	Create a Doctor account	Account should be created	Account created successfully	Ok
22	Administrator	Create a Nurse account	Account should be created	Account created successfully	Ok
23	Administrator	Create a Receptionist account	Account should be created	Account created successfully	Ok
24	Administrator	Delete a doctor account	Account should be deleted	Account deleted successfully	Ok
25	Administrator	Delete a Nurse account	Account should be deleted	Account deleted successfully	Ok
26	Administrator	Delete a Receptionist account	Account should be deleted	Account deleted successfully	Ok
27	Receptionist	Register a patient	Patient registered ID create and should display	Patient registered and ID displayed	Ok
28	Receptionist	Print patient's record	Should print the report	Printed successfully	Ok
29	Receptionist	Discharge a patient	Patient should discharge	Patient discharged	Ok
30	Receptionist	Refresh button pressed	Online doctors, nurses and beds vacant should be refreshed and displayed	Refreshed and displayed	Ok

31	Receptionist	Logout button pressed	Message displayed "Do you want to log out YES/NO"	Message displayed	Ok
32	Receptionist	Yes button pressed on logout message	Logout and display main form	Logout successfully and main form displayed	Ok
33	Receptionist	No button pressed on logout message	Control should returned to the reception form	Control returned	Ok
34	Receptionist	Change his/her password	Change password upon entering the correct pin code	Password changed on correct pin code input	Ok
35	Nurse	Appoint a patient	Should appoint the patient successfully	Patient appointed successfully	ok
36	Nurse	Appoint same patient again	Display message "Patient already appointed"	Message displayed	ok
37	Nurse	View the prescription	Can view the medicine of any patient upon entering ID	Medicines displayed upon entering ID	ok
38	Nurse	Monitoring Panel View	View monitoring panel	Monitoring panel viewed	ok
39	Nurse, Monitoring panel	Monitor the patients	Monitor successfully	Monitoring patients successfully	ok

40	Nurse, Monitoring panel	Handle abnormality	Should acknowledge the abnormality	Abnormality acknowledged	Ok
41	Nurse, Monitoring panel	View prescription	View the prescription of specific id	Prescription viewed	Ok
42	Nurse, Monitoring panel	View live video	Video viewed upon each bed click	Displayed the video of particular bed upon click	ok
43	Nurse, Monitoring panel	View live reading	Live readings should be displayed	Displayed the reading of specific patient who is selected	Ok
44	Nurse	Change his/her password	Change password upon entering the correct pin code	Password changed on correct pin code input	Ok
45	Nurse	Refresh button pressed	Medicine time and patients to be appointed should refreshed	Refreshed and displayed	Ok
46	Nurse	Logout button pressed	Message displayed "Do you want to log out YES/NO"	Message displayed	Ok
47	Nurse	Yes button pressed on logout message	Logout and display main form	Logout successfully and main form displayed	Ok
48	Nurse	No button pressed on logout message	Control should returned to the nurse form	Control returned	Ok

49	Doctor	View his/her patients	Should view his/her patients	Patients displayed	Ok
50	Doctor	View his/her appointments	Should view his/her appointments	Appointments displayed	Ok
51	Doctor	View medical emergency	Should view emergency	Emergency viewed	Errors were found but rectified Ok
52	Doctor	View his/her patient's prescription	Should view his/her patient's prescription	Patient's prescription displayed	Ok
53	Doctor	View his/her patient's history	Should view his/her patient's history	Patient's history displayed	Ok
54	Doctor	View his/her patient's live data	Should view his/her patient's live data	Patient's live data displayed	Ok
55	Doctor	View his/her patient's live video	Should view his/her patient's live video	Patient's live video displayed	Ok
56	Doctor	Edit his/her patient's prescription	Should edit his/her patient's prescription	Patient's prescription edited	Ok
57	Doctor	Change his/her password	Change password upon entering the correct pin code	Password changed on correct pin code input	Ok
58	Main Form	Log in with same account on 2 PCs	One should display message "Already Logged in"	Message displayed	Ok

CHAPTER # 7

USER MANUAL

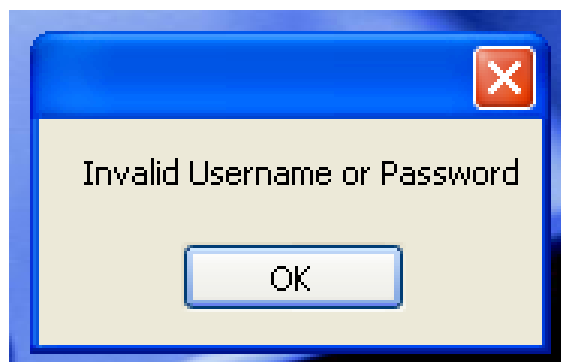
This chapter covers the user manual of our software. It will introduce the user interfaces to the users.

7.1 Starting the Application

After starting the application, the user will see the following screen,.



In this screen you have to enter the user name, password and our designation to login. Only authorized persons are allowed to login. If somebody tries to login he/she will see the following screen



7.2 Receptionist Panel

The screenshot displays the Receptionist Panel interface. At the top left is the 'Health Care Hospital' logo. The main title 'Reception' is prominently displayed in the center. Below the title, the date and time '11/11/2010 4:08:58 PM' are shown. A 'Refresh' button is located in the top right corner. The interface is organized into three main columns:

- Online Doctor(s):** Lists 'D , Medical Specialist'.
- Online Nurse(s):** Lists 'Mary Jhon'.
- Beds Vacant:** Lists bed numbers from 3 to 12.

On the left side, there is a sidebar with several functional buttons: 'Reg. Patient', 'Discharge Patient', 'Enter Report Data', 'Logout', and 'My Account'.

After the login by reception, he/she will see the above screen.

Receptionist can do the following activities: -

- View the beds vacant
- View all online doctors
- View online nurses
- Can register a patient
- Can discharge a patient
- Can enter the patients health reports data
- Receptionist can change his/her password by clicking on “My Account” button
- Can Log out

7.2.1 Register a patient

Health Care Hospital

Patient's Registration Form

Admission Date: 11/11/2010 4:17:18 PM

Name:

Mother Name:

Address:

Age:

Sex:

Phone No.:

Nationality:

N.I.C:

Marital Status:

Name of Next of Kin:

Phone No. of Next of Kin:

Medical History:

Present Disease:

Injuries / surgeries:

Blood Pressure:

Temperature (F):

Weight (KG):

Height (Feet Inches):

Bed Allocated:

Doctor Assigned:

Do you Drink Alcohol? Yes No

Do you Smoke? Yes No

Allerav / Hav Fever Yes No

Runny Nose Yes No

Chronic Cough Yes No

Dry Throat / Mouth Yes No

Asthma Yes No

Heart Pain Yes No

High Blood Pressure Yes No

Low Blood Pressure Yes No

Diarrhea Yes No

Constipation Yes No

Joint / Muscle Pain Yes No

Anemia Yes No

Bleeding Problems Yes No

Any Other Medical Conditions:

In the above screen receptionist can register a new patient by filling the fields, receptionist can leave NIC, Medical History, Injury Surgery, Any other medical condition IF not required?

After filling the fields receptionist has to enter his/her pin code to save the record, on a valid pin code system will admit a new patient and shows a message of “Patient successfully registered and patient id is = ‘The auto generated id’”.

After the message system will open the printable report of newly admitted patient and receptionist has to print the report to attach the report in to the file of the patient.

7.2.2 Patient Registered

Health Care Hospital

Patient's Registration Form

Admission Date: 11/11/2010 4:28:06 PM

Name: Sufian Ali

Mother Name: Abida

Address: House no 12 A streent 13 E 7 islamabad

Age: 45

Sex: Male

Phone No.: 0333-2655884

Nationality: Pakistani

N.I.C: 32165-5698897-9

Marital Status: Married

Name of Next of Kin: Aliyan

Phone No. of Next of Kin: 0333-2655885

Medical History: NO

Present Disease: Chest pain

Injuries / surgeries: NO

Height (Feet Inches): 5.2

Bed Allocated: 11

Doctor Assigned: D

Do you Drink Alcohol? Yes No

Do you Smoke? Yes No

Allerav / Hav Fever Yes No

Runny Nose Yes No

Chronic Cough Yes No

Dry Throat / Mouth Yes No

Asthma Yes No

Heart Pain Yes No

High Blood Pressure Yes No

Low Blood Pressure Yes No

Diarrhea Yes No

Constipation Yes No

Joint / Muscle Pain Yes No

Anemia Yes No

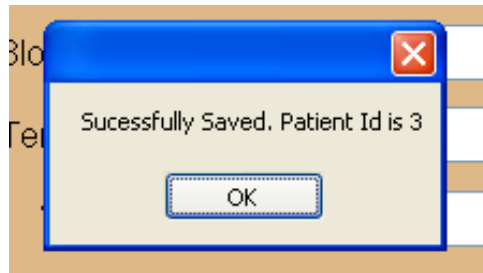
Bleeding Problems Yes No

Any Other Medical Conditions: NO

Reset Pin Code Save

Save Confirm
Do you really want to save ? Yes / No
Yes No

Upon filling the form like above receptionist have entered the pin code and clicked save the above message box is shown that are you really want to save the record if receptionist click yes he / she will see the following message that patient registered and id is “Generated ID”



7.2.3 Patient Registered printable report

After registering the patient receptionist will see the printable report as follows.



Arrow is pointing to the print button when clicked it will print the report. Sample of printed report is attached.

7.2.4 Discharge a patient

In the discharge form here receptionist can discharge a admitted patient by entering patient's ID

Health Care Hospital

Patient Discharge

Enter Patient Registration No.

3

View Patient Data Reset

Patient's Data

Name Sufian Ali

Sex Male

Admission Date 11/11/2010 4:28:06 PM

Bed No. 11

Related Doctor D

Pin Code Discharge

After entering the ID in registration box then click the “view patient data” button to view the patient name and bed no to confirm that it is the patient you wish to discharge.

After confirmation enter the receptionist pin code and click “discharge” button to discharge the patient. The patient will be discharged and will no longer be seen in doctor's panel and in nurse's panel.

Following screen will be seen after clicking the discharge button

Heads Care Hospital

Patient Discharge

Enter Patient Registration No.

3

View Patient Data Reset

Patient's Data

Name S Patient Discharged

Sex M

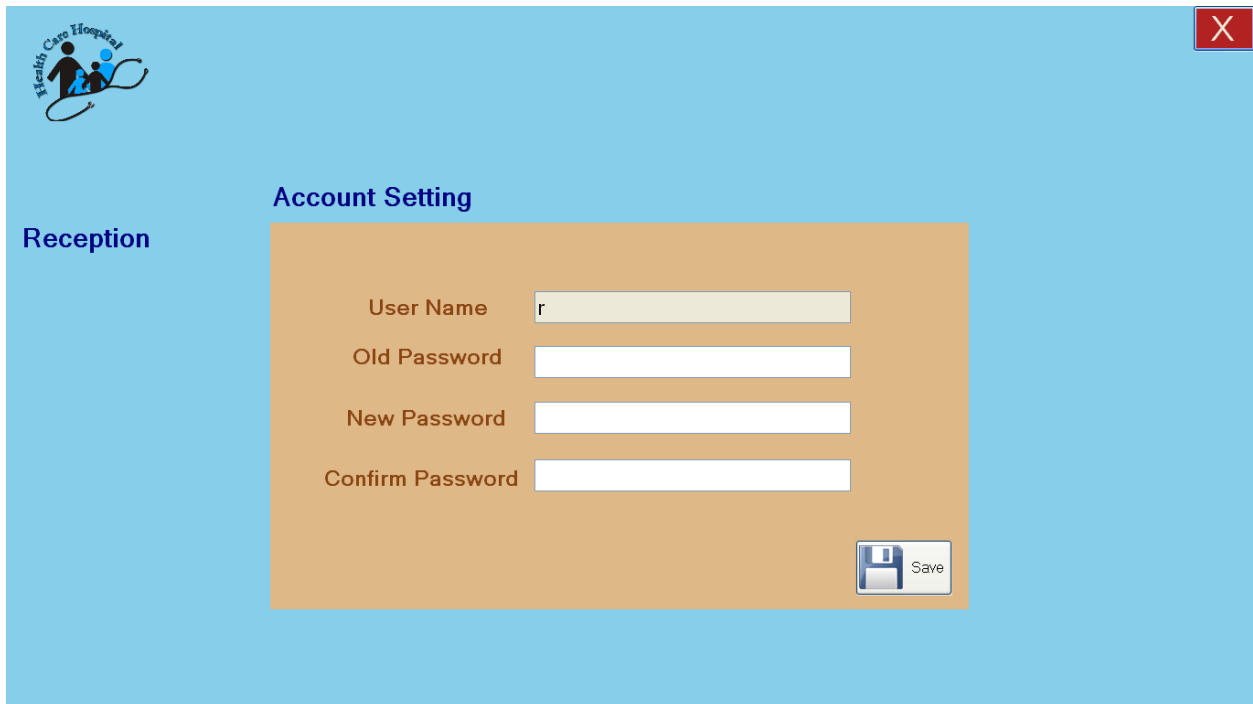
Admission Date 11/11/2010 4:28:06 PM

Bed No. 11

Related Doctor D

Pin Code ●●●● Discharge

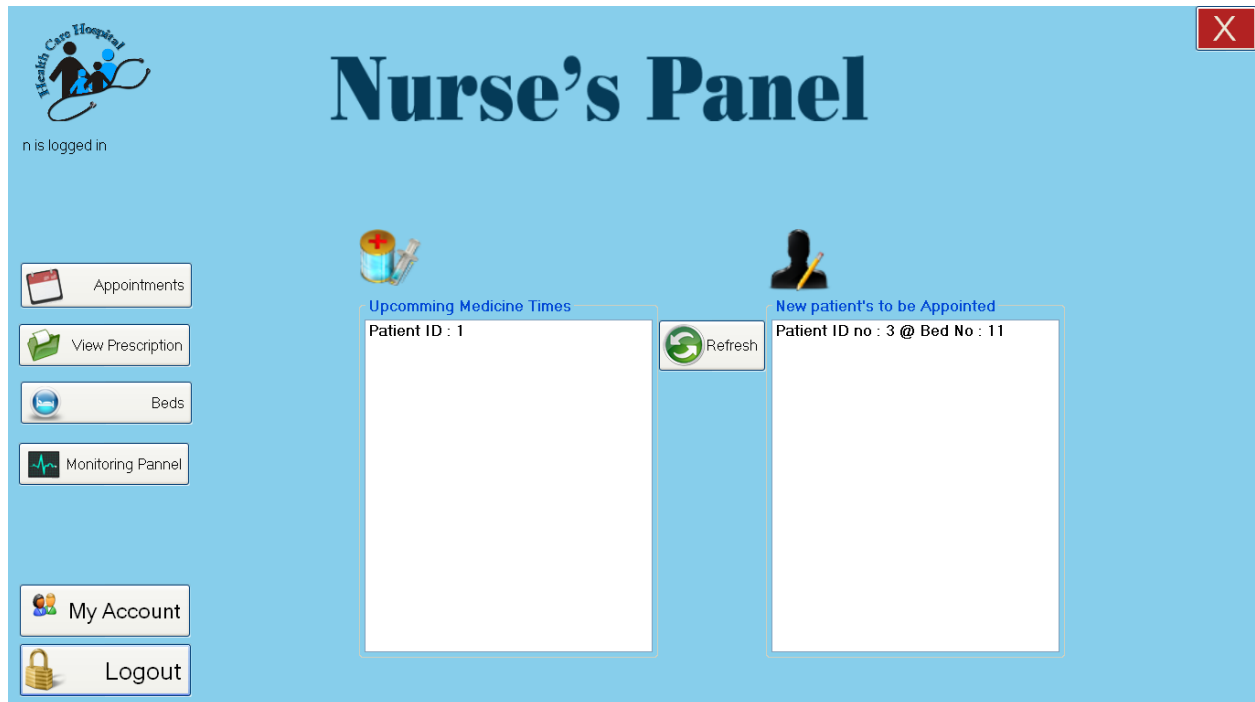
7.2.5 Reception My Account



The screenshot displays a web application window titled "Health Care Hospital" in the top left corner. The main content area has a light blue background. On the left side, there is a vertical menu with the word "Reception" highlighted in blue. In the center, there is a brown rectangular box titled "Account Setting". Inside this box, there are four input fields: "User Name" (containing the letter 'r'), "Old Password", "New Password", and "Confirm Password". At the bottom right of the brown box is a "Save" button with a floppy disk icon. A red close button (X) is located in the top right corner of the application window.

The above screen will be shown for reception to change his/her password

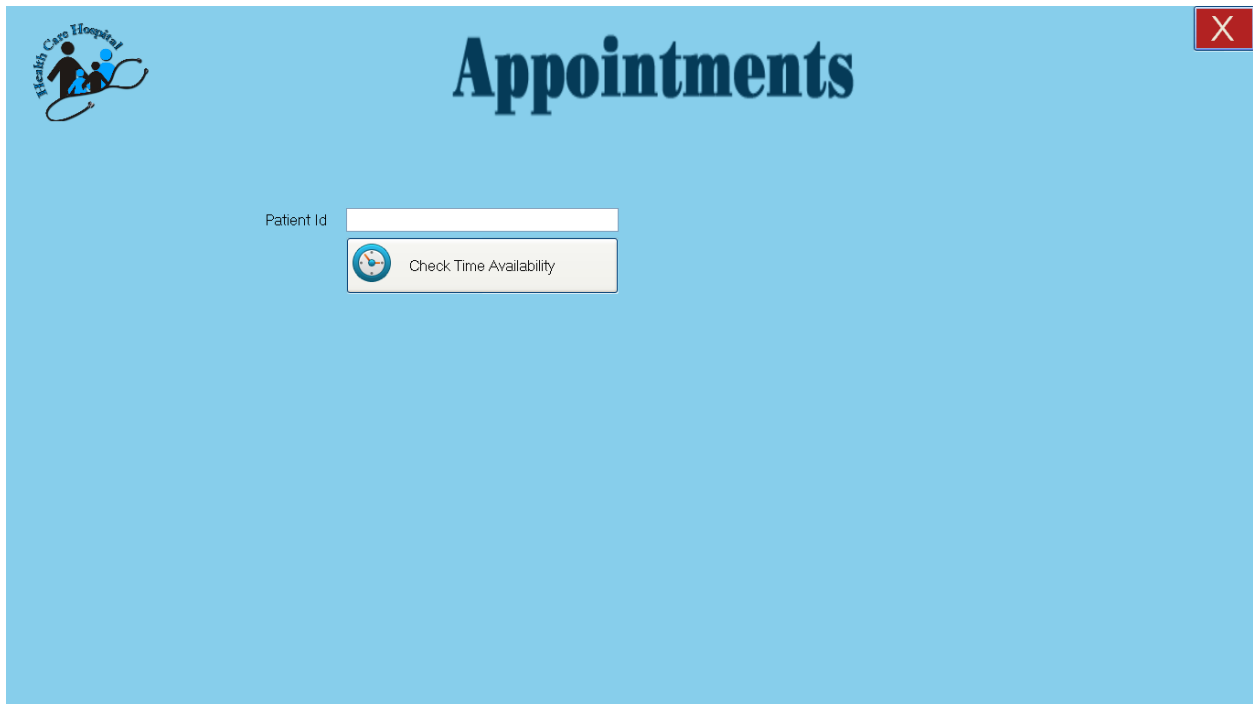
7.3 Nurse Panel



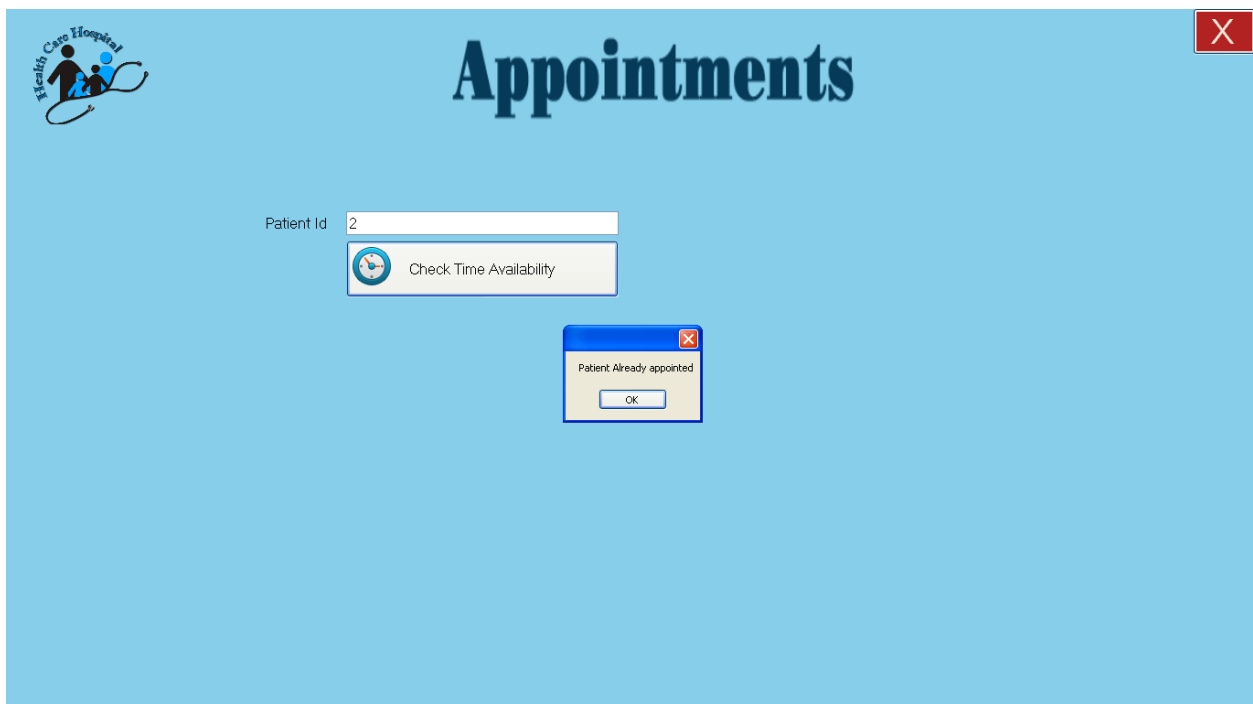
After logging in with the nurse account nurse can see the above screen. He/she can view the upcoming timings of the medicines and new patients to be appointed.

- He/she can do the following tasks: -
- Can give an appointment to a patient by selecting the “Appointments” button.
- Can view the medical prescription of specific patient upon entering the ID
- Can monitor all the patients in the ward
- Change the password by clicking the “My Account” button
- Can Log out

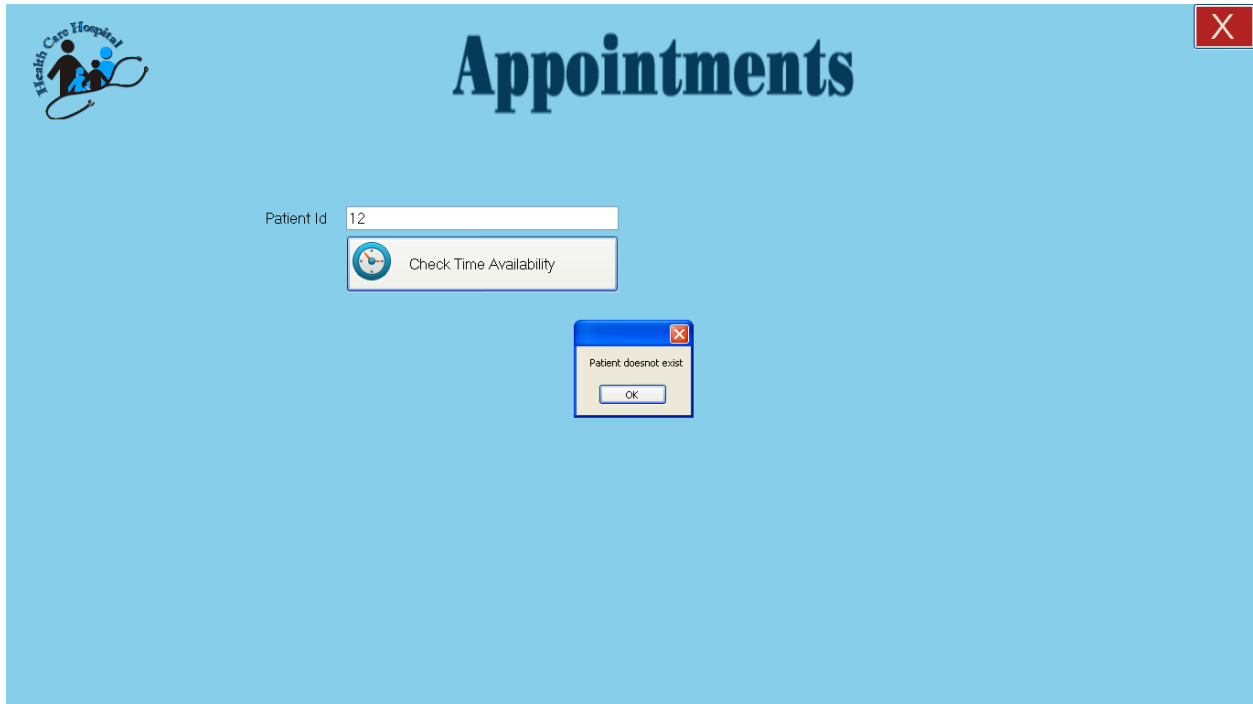
7.3.1 Appointments



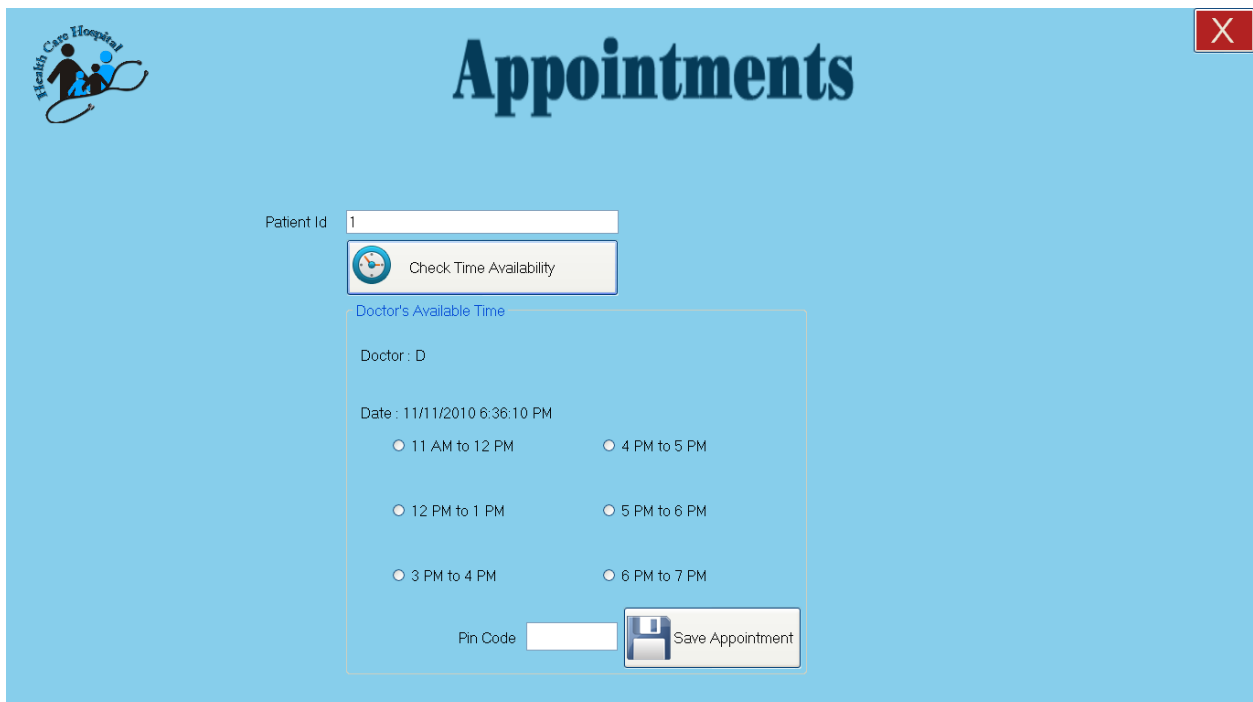
He/she can appoint a patient by entering the id of the patient in the system, if a patient is already appointed the following screen will be shown that “Patient already appointed”.



If he/she enters a wrong or invalid patient id to appoint the system will show the following screen showing that “Patient ID does not exist”



Upon entering the correct ID the following form will be shown



In the above screen the patient's Doctor is shown.

Free time is also shown in the form here receptionist can select any time and save an appointment after entering pin code and it will be viewed to the doctor.

If a time is given to any patient before that time in the form will be disabled like in the following form 11 Am to 12 Pm is disabled

Health Care Hospital

Appointments

Patient Id

Check Time Availability

Doctor's Available Time

Doctor : D

Date : 11/11/2010 6:40:33 PM

11 AM to 12 PM 4 PM to 5 PM

12 PM to 1 PM 5 PM to 6 PM

3 PM to 4 PM 6 PM to 7 PM

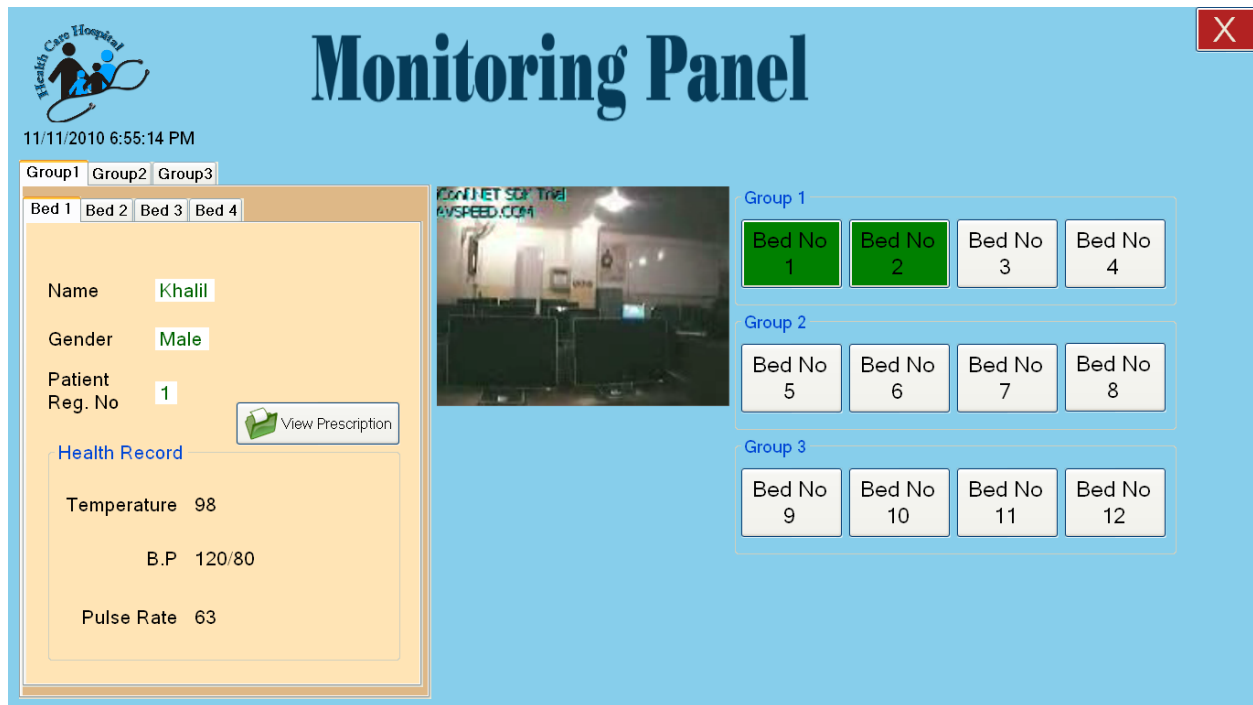
Pin Code Save Appointment

7.3.2 Prescription

By clicking the “prescription” button the user will see the following screen in which user can see the medicines of a patient.



7.3.3 The Monitoring Panel



The above screen is the main part of our project that is “Monitoring Panel” here user can monitor all the patients and can see the live data of the patients. By clicking on the buttons on the right side of the screen user can switch to other patients. If there is no patient on a particular bed user will not see the live data but he/she can see the live video of the bed (for spying purpose).

“View prescription” button will lead the user to the information of medicines of the particular patient.

7.3.4 The Monitoring Panel (Monitoring Abnormality)

The screenshot shows the 'Monitoring Panel' interface. At the top left is the 'Health Care Hospital' logo. The title 'Monitoring Panel' is prominently displayed. Below the title, the date and time are shown as '11/11/2010 6:54:19 PM'. There are tabs for 'Group1', 'Group2', and 'Group3'. Under 'Group1', there are sub-tabs for 'Bed 1', 'Bed 2', 'Bed 3', and 'Bed 4'. The patient details for 'Bed 1' are: Name: Khalil, Gender: Male, Patient Reg. No: 1. A 'View Prescription' button is present. The 'Health Record' section shows: Temperature: 99 (with a red 'OK' button), B.P: 120/80, and Pulse Rate: 63. To the right, a grid of 12 beds is shown, grouped into three groups of four. Bed No 1 is highlighted in red, Bed No 2 is green, and the others are white. A live video feed of the patient's room is shown in the center, with a watermark 'AVSPEED.COM'.

In the above screen patient at bed 1 is having abnormality in temperature. Here nurse will act upon it. The patient can be accessed by his/her bed no, if an abnormality in the live data occurs that particular bed will blink in red/green color so that user can see the abnormal condition easily, the system will produce a beep sound also so that nurse can respond to that and easily check that where the abnormality is occurred.

The system will show the parameter in which the abnormality is occurred in above example temperature is rising from the normal range. And a button of ok is shown against it. If nurse responds and click the ok button the system will consider that nurse have acknowledged and has taken the appropriate actions for the patient to bring the patient into normal condition. Then the color of the button will get back to Green indicating that the patient is normal as shown in the picture in 7.3.3

7.3.5 My Account

Health Care Hospital

Nurse

Account Setting

User Name

Old Password

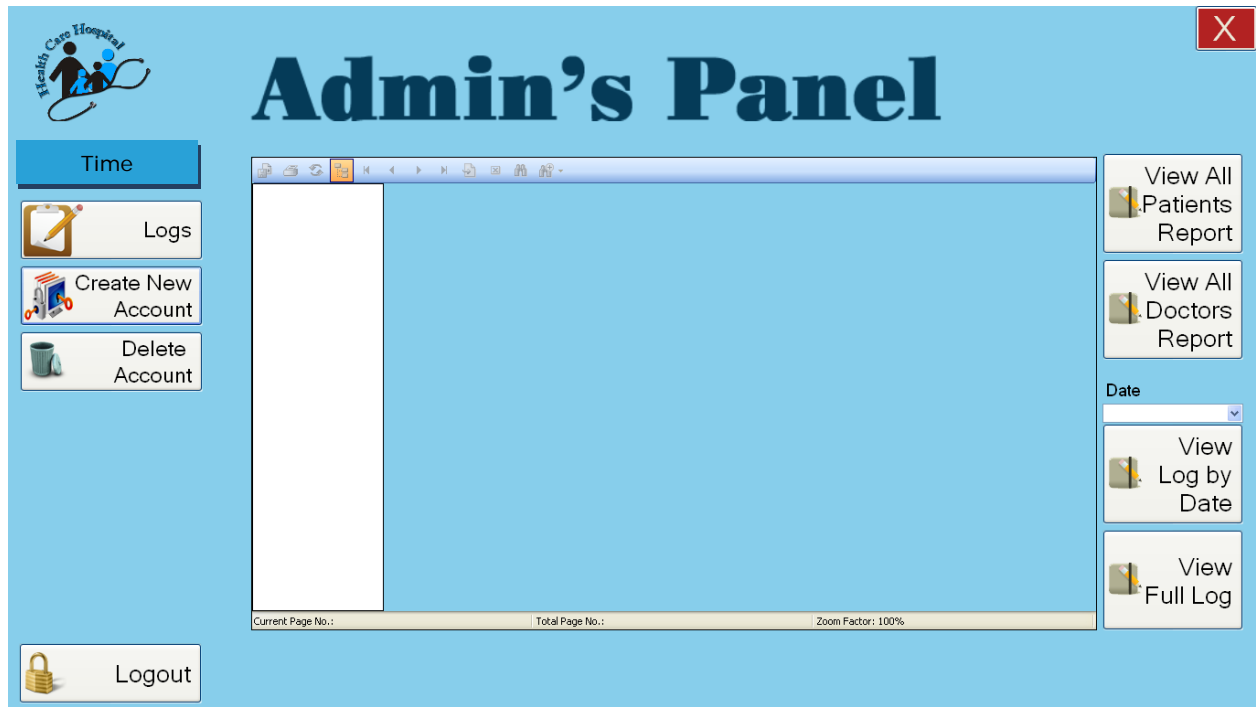
New Password

Confirm Password

Save

In the above screen nurse can change his/her account password.

7.4 Administrator Panel



The Administrator panel will look like the above screen in which Administrator can do the following actions:

- View the Logs/Reports
 - All patients that are admitted
 - All doctors
 - View the login logout details by date
 - View all login logout details
- Create a new account of:
 - Nurse
 - Doctor
 - Receptionist
- Delete an account of:
 - Nurse
 - Doctor
 - Receptionist

7.4.1 All Patients Report

Admin's Panel

Time

Logs

Create New Account

Delete Account

Logout

View All Patients Report

View All Doctors Report

Date

View Log by Date

View Full Log

Health Care Hospital

All Admitted Patients Report

Report Generated on 11/11/2010 7:06:55PM

ID	Name	Address	Admission Date	Bed No
1	Khalil	RWP Pakistan	10/13/2010 1:53:40 PM	1
2	Ahmad	house no 4 street 3 f8 -1 islamabad	11/8/2010 2:27:06 PM	2

All rights Reserved HCH Islamabad 2010 ©

Current Page No.: 1 Total Page No.: 1 Zoom Factor: 100%

The system will show all the patients that are currently admitted in the ward. User can print it by clicking on print. A sample printed report is attached.

7.4.2 All Doctors Report

Admin's Panel

Time

Logs

Create New Account

Delete Account

Logout

View All Patients Report

View All Doctors Report

Date

View Full Log

Health Care Hospital

Report Generated on 11/11/2010 7:07:06PM

ID	Name	Address	Phone	Specialist In	Reg_Date
d	D	House no 55 street 10 islamabad	0321212121	Medical Specialist	13-12-2008

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Current Page No.: 1 Total Page No.: 1 Zoom Factor: 100%

This report will give the information of all the doctors in the hospital.

7.4.3 Login Logout Report by Date

Admin's Panel

Time

- Logs
- Create New Account
- Delete Account

Logout

Health Care Hospital Log Table

Report Generated on 11/11/2010 7:07:23PM

Sr.No	User Name	Date	Time	Designation	Status
1,085	d	11/11/2010	3:58 PM	Doctor	Login
1,086	d	11/11/2010	3:59 PM	Doctor	Logout
1,087	n	11/11/2010	4:00 PM	Nurse	Login
1,088	n	11/11/2010	4:02 PM	Nurse	Logout
1,089	admin	11/11/2010	4:02 PM	Admin	Login

View All Patients Report

View All Doctors Report

Date: 11/11/2010

View Log by Date

View Full Log

The user have to select a date (arrow is pointing to the date box in the screen shot) the click the view log by date button the system will show the report of those users who have logged in and logged out on that particular date.

7.4.4 Full Login Logout Report

Admin's Panel

Time

Logs

Create New Account

Delete Account

Logout

View All Patients Report

View All Doctors Report

Date: 11/11/2010

View Log by Date

View Full Log

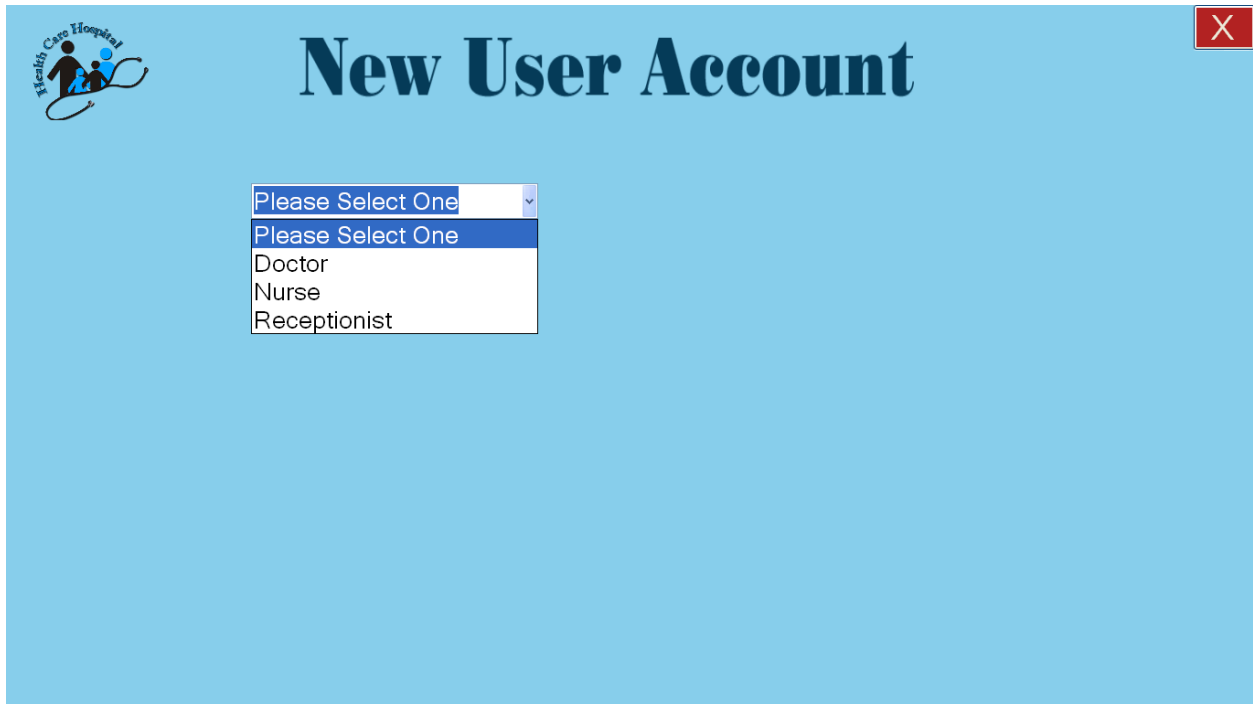
Health Care Hospital Daily Log Table
Report Generated on 11/11/2010 7:07:32PM

Sr. No	Name	Date	Time	Designation	Status
415	d	10/13/2010	13:37:41	Doctor	Login
416	d	10/13/2010	13:37:47	Doctor	Logout
417	admin	10/13/2010	13:37:59	Admin	Login
418	admin	10/13/2010	13:41:20	Admin	Login
419	admin	10/13/2010	13:44:39	Admin	Login
420	admin	10/13/2010	13:48:16	Admin	Login
421	admin	10/13/2010	13:49:18	Admin	Logout

Current Page No.: 1 Total Page No.: 26 Zoom Factor: 100%

The user can view the full log of the login logout details any time by clicking the full log button the system will show the full login logout details as shown in the above screen shot.

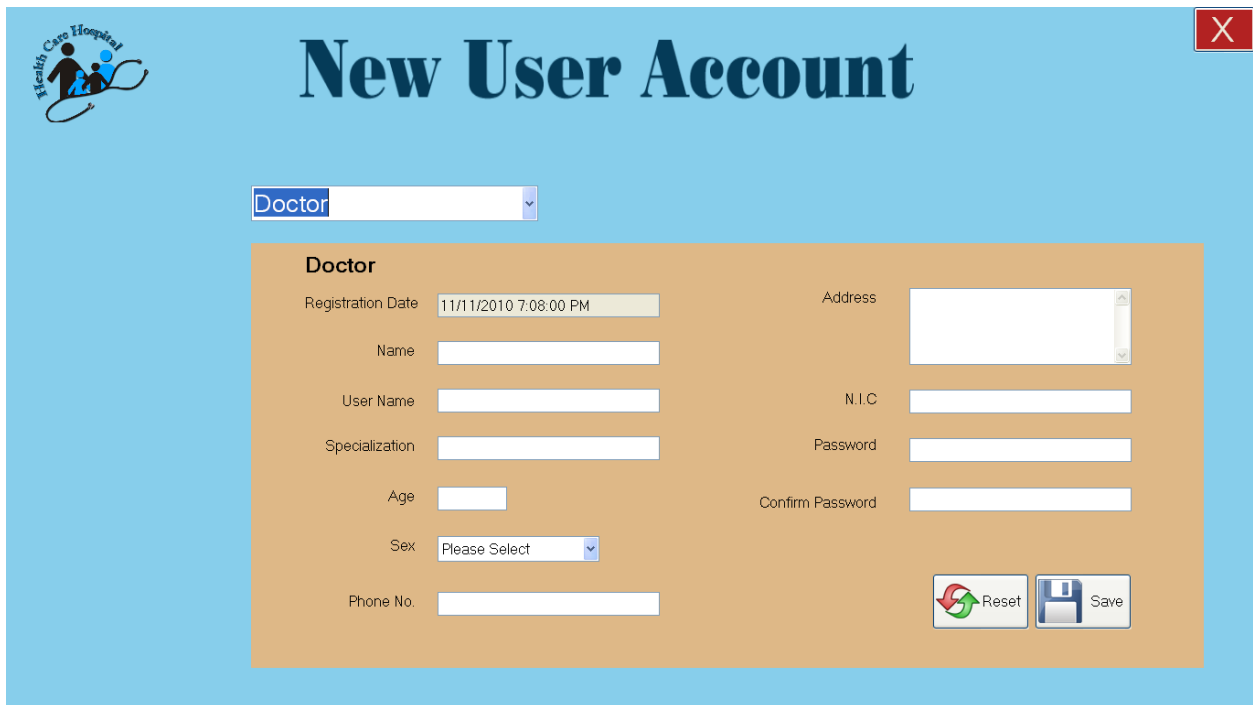
7.4.5 Create a new Account



Administrator can create a new account of (Nurse, Doctor and Reception).

Administrator will select the account type to create a account as shown in the screen shot.

7.4.5.1 Create a new Doctor Account



New User Account

Doctor

Doctor

Registration Date: 11/11/2010 7:08:00 PM

Name:

User Name:

Specialization:

Age:

Sex: Please Select

Phone No.:

Address:

N.I.C.:

Password:

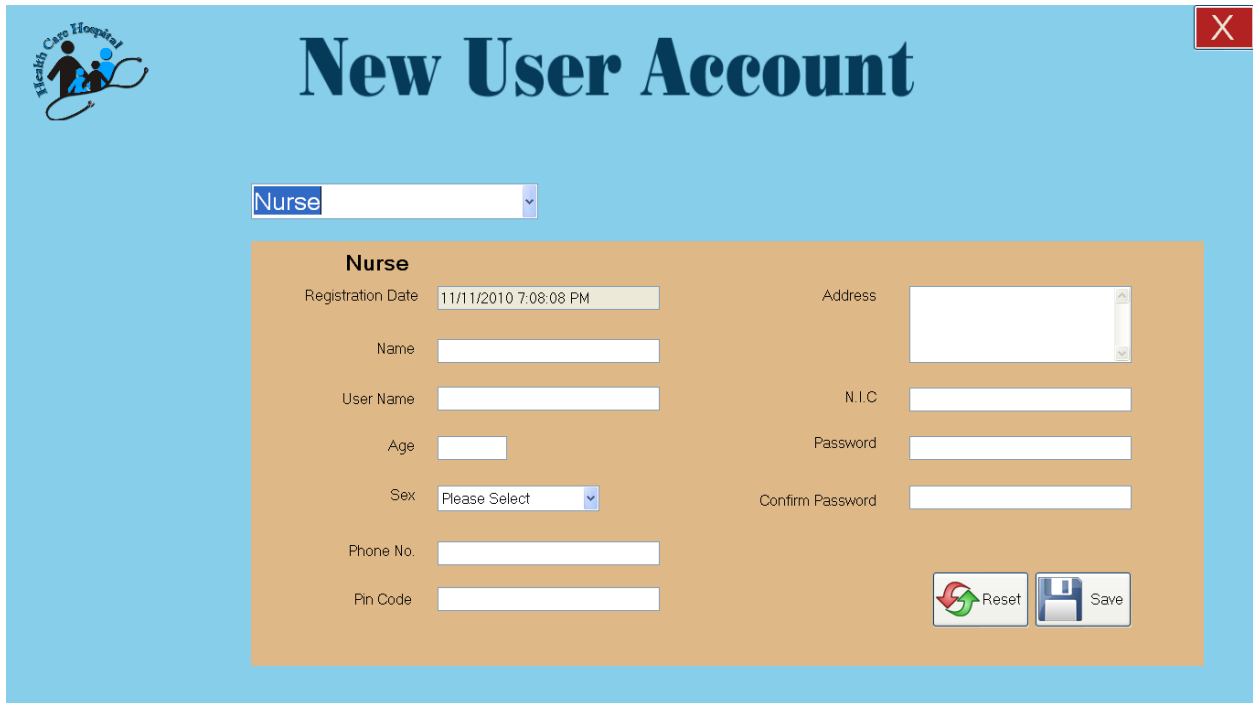
Confirm Password:

Reset Save

By filling all the field and clicking save button will create a Doctor account for a new Doctor.

Reset button will clear all the fields when pressed.

7.4.5.2 Create a new Nurse Account



The screenshot shows a web application interface for creating a new user account. The title is "New User Account" in large blue font. A logo for "Health Care Hospital" is in the top left. A dropdown menu is set to "Nurse". The form fields are as follows:

Nurse	
Registration Date	11/11/2010 7:08:08 PM
Name	<input type="text"/>
User Name	<input type="text"/>
Age	<input type="text"/>
Sex	Please Select
Phone No.	<input type="text"/>
Pin Code	<input type="text"/>
Address	<input type="text"/>
N.I.C	<input type="text"/>
Password	<input type="password"/>
Confirm Password	<input type="password"/>

At the bottom right of the form are two buttons: "Reset" (with a circular arrow icon) and "Save" (with a floppy disk icon).

By filling all the field and clicking save button will create a Nurse account for a new Nurse.

Reset button will clear all the fields when pressed.

7.4.5.3 Create a new Reception Account



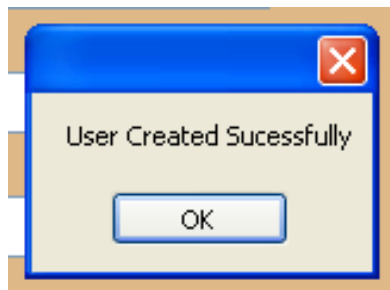
The screenshot shows a web application window titled "New User Account" with a "Health Care Hospital" logo in the top left. A dropdown menu is set to "Receptionist". The form contains the following fields:

- Registration Date: 11/11/2010 7:08:15 PM
- Name:
- User Name:
- Age:
- Sex: Please Select (dropdown)
- Phone No.:
- Pin Code:
- Address:
- N.I.C:
- Password:
- Confirm Password:

At the bottom right of the form are "Reset" and "Save" buttons.

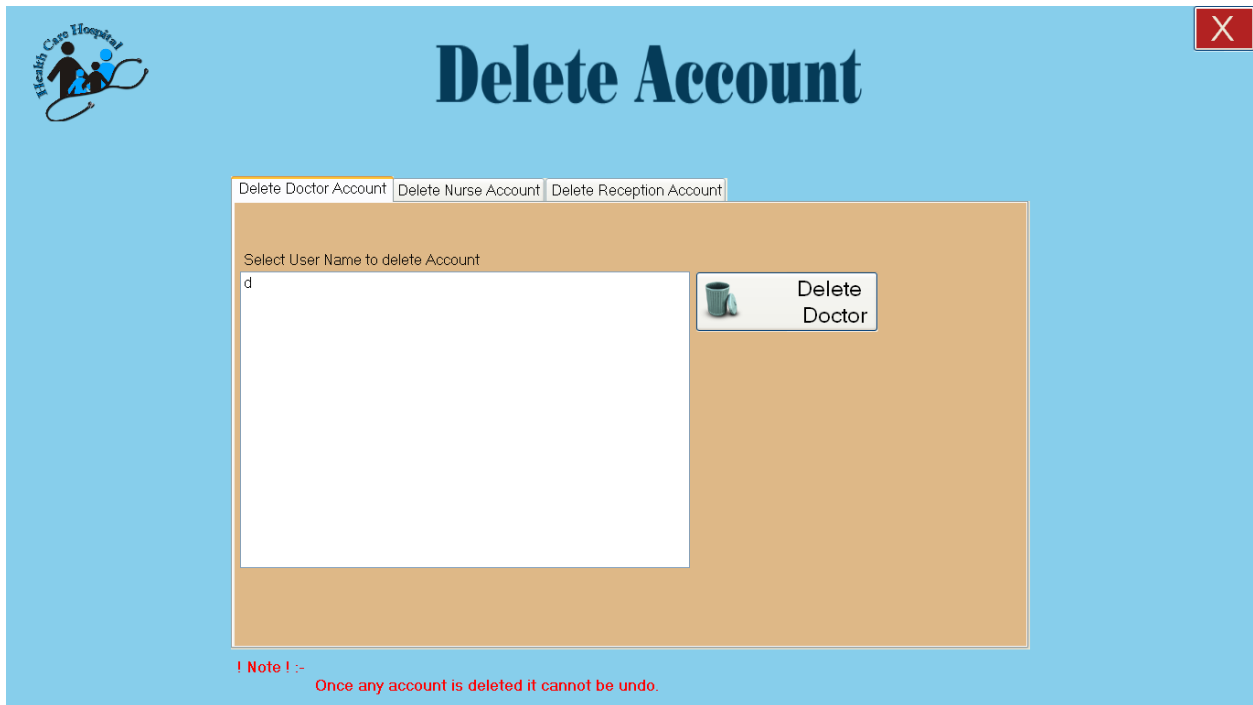
By filling all the field and clicking save button will create a Receptionist account for a new Receptionist.

Reset button will clear all the fields when pressed.



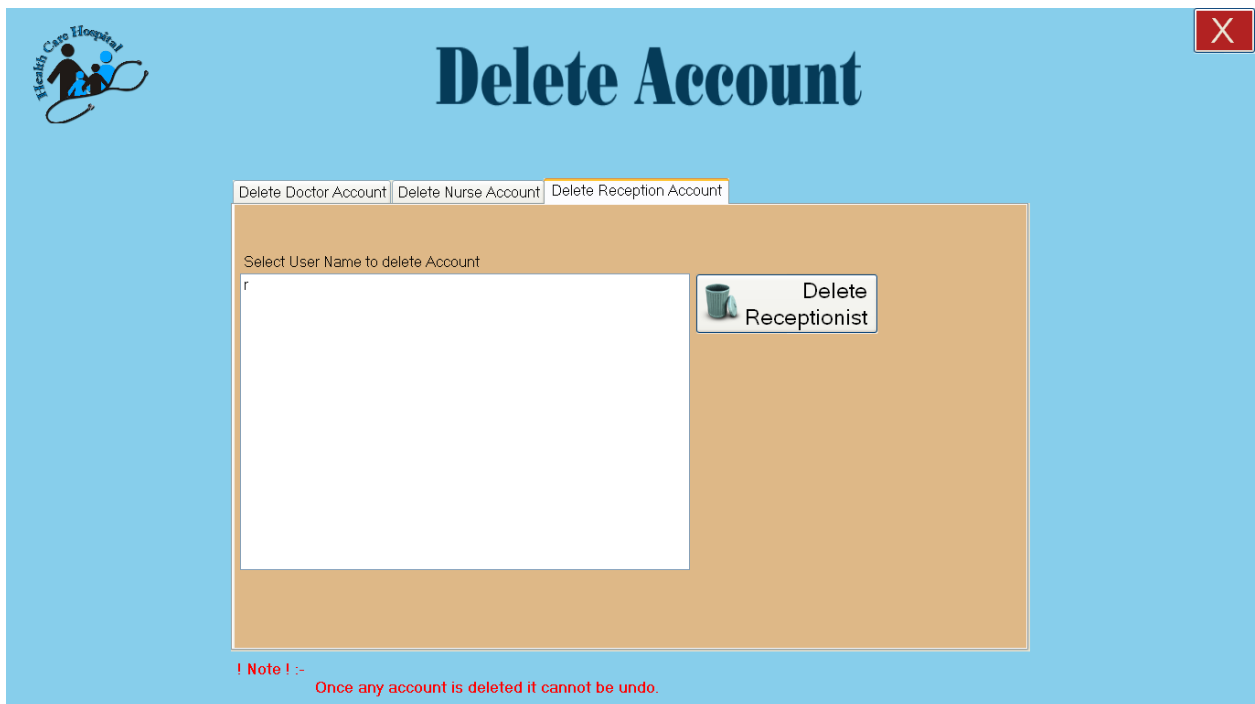
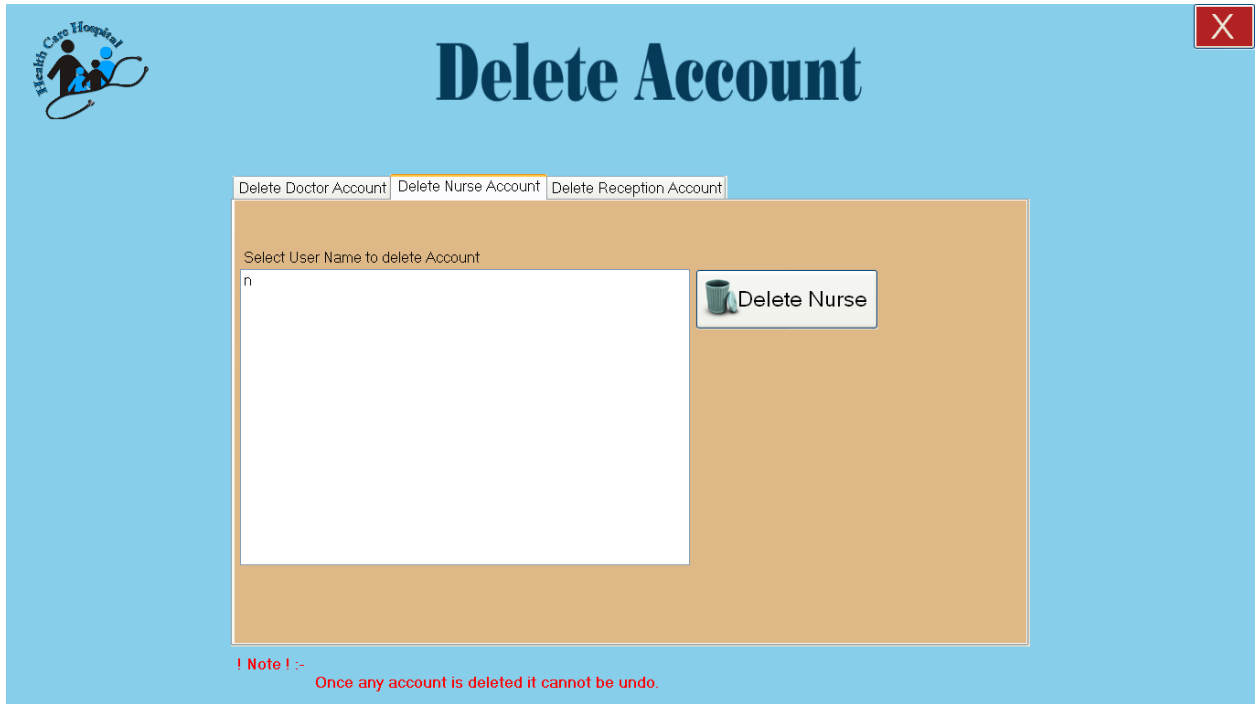
In the create account form when save is pressed after entering all the fields will display the above message.

7.4.6 Delete Account

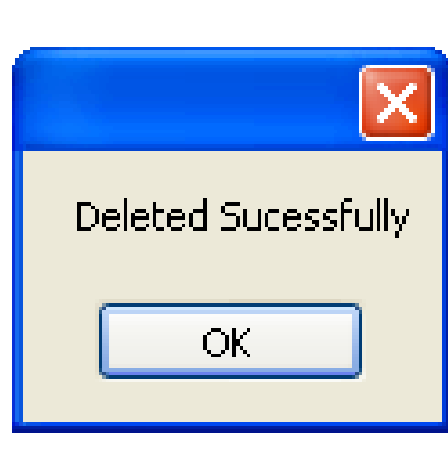


Delete account will show the above screen and system will show the existing users in the list box. Doctor's account will be shown in the doctor tab, nurse account in nurse tab and receptionist account in receptionist tab.

Screen of delete nurse account and delete receptionist account are as follows:



After deleting an account user will see the following screen.



If user press delete button without selecting any account the system will show a message as follows:



CHAPTER # 8

Sample Reports

CHAPTER # 9

Future Enhancements

9.1 Video Monitoring with Motion Detection

In our software the patient is monitored by simple live video, to enhance the security of the patient video can be implemented with motion detection, so that if somebody comes near to the patient the camera will detect the motion and starts recoding. Alarm at the time of any movement can also be generated for faster actions.

9.2 Account Details

Currently our software has no billing module, so billing module is another feature to be added in future.

9.3 Scope of Medical Sensors

The project has been designed for all of the medical sensors such as Heart Rate, Blood Pressure, Sugar etc but due to lack of funds we have completed our project with three sensors but our project can be enhanced by integrating more sensors.

9.4 Web based Software

Trends are for self-health care, patients perform simple tests at their home and save the record online in Electronic Patient Journal where further actions are performed to get out the health results. Currently our software is working on Local Area Network (LAN), in future it can be modified to make it work from internet, and this feature will increase our software's accessibility. There would be need of more resources such as faster internet without disconnections, static IPs.

9.5 Case Study of Shifa Hospital (Dialysis Department)

Our software can be modified for the dialysis department of Shifa International Hospital Islamabad, a brief thesis is presented here to understand that how our software can be modified.

This case study is about the research of dialysis department of Shifa International hospital.

9.5.1 What is Dialysis

Dialysis is a process whereby impurities and toxins are removed from the body by a machine. This procedure is done on patients whose kidneys are not working to perform this function properly.

In general, the kidneys (each person has two, one left and one right) to filter the blood. All day long, the heart pumps blood through the kidneys. Much of the material in the blood, including proteins and cells, are too large to pass through the filter system of the kidney, and remain in the bloodstream. Small molecules do pass through the kidney's filter system. These include water, dissolved salts (called ions), and other metabolites. Much of these materials are reabsorbed by the kidney into the bloodstream, to keep the body working properly (the salt concentration of the blood must be kept just right at all times). Any materials that are not needed are sent out of the kidney as urine. Urine travels from the kidney via the ureters to the bladder, where it is temporarily stored until we go to the bathroom.

9.5.2 Working of dialysis Machine

Dialysis is a way for a machine to perform the same function as the kidney, when someone's kidneys are failing. If a person is having kidney failure, and does not get dialysis, the body will not be able to remove waste products from the blood, or be able to maintain proper salt concentration of the blood. The person will get very sick, and can eventually die.

9.5.3 The Dialysis Machine



9.5.4 Problem Description:

The dialysis department of Shifa International hospital is equipped with about 40 dialysis machines having 40 patients for 4 hour treatment. The room of doctor is far away from dialysis room due to this reason doctor feel difficult to go to the dialysis room and check every patient while checking his regular patients.

While in case of emergency there is no mechanism to inform the doctor about the emergency in dialysis room. Sometimes doctors could be on leave so they can't check their patients. We consulted the doctor of Shifa International Hospital Doctor told us about the following problems of their Dialysis Department.

1. The dialysis room is far from the doctor's room.
2. No remote access to the dialysis room.
3. No online access.

9.5.5 Doctor's Requirements:

Following are the needs of the doctor

1. Doctor wants to check the patients while being in the office that means doctor want live video and sound of patient's heart and breath along with the dialysis machine parameters.
2. Doctor wants to communicate with the patient like he is talking to the patient directly.
3. Doctor wants to access his/her patients from the web also.

9.5.6 Problem Solution:

Solution of the problem is to implement software that will monitor the dialysis room and records information.

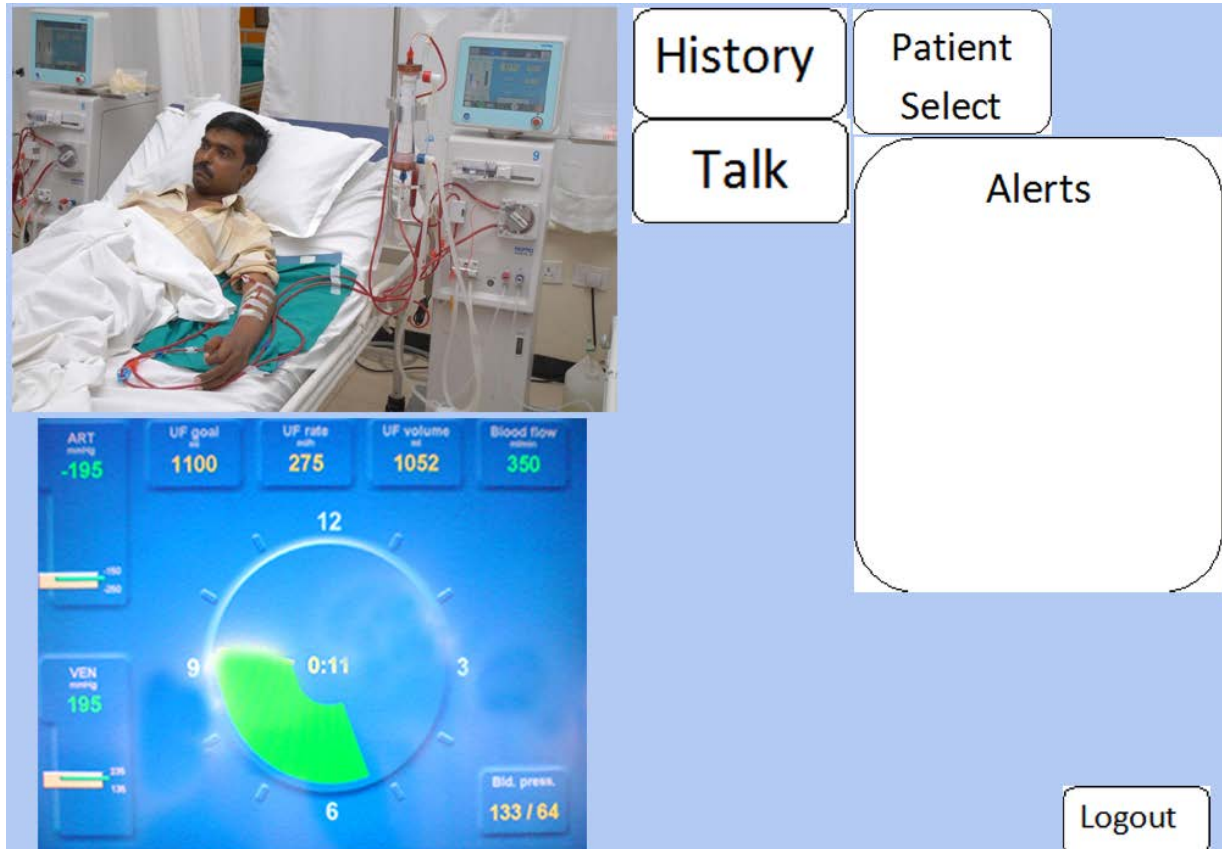
Our software can be implemented in Shifa International Hospital's Dialysis Department which will include the following features

Live video of patient along with voice to communicate with the patient

1. Dialysis parameters
2. Intelligent agents
3. Alarms for the doctors and nurses in case of emergency
4. Web based implementation of the software
5. Sms notification in case of emergency

9.5.7 Demo Interface

A demo interface presenting the doctor's panel in Shifa Hospital.



References

Websites:

- [1] <http://www.avspeed.com/avcontent/iconf-net-video-conferencing-sdk>
- [2] http://en.wikipedia.org/wiki/Spiral_model
- [3] http://en.wikipedia.org/wiki/.NET_Framework
- [4] http://en.wikipedia.org/wiki/SQL_Server_Management_Studio
- [5] http://en.wikipedia.org/wiki/Unified_Modeling_Language
- [6] http://en.wikipedia.org/wiki/Use_case_diagram
- [7] http://en.wikipedia.org/wiki/Database_design

Research Papers:

[1] Security for pervasive medical sensor networks

This paper appears in: [Mobile and Ubiquitous Systems: Networking & Services, MobiQuitous, 2009. MobiQuitous '09. 6th Annual International](#)
Issue Date : 13-16 July 2009
On page(s): 1 - 10
Location: Toronto, ON
Print ISBN: 978-963-9799-59-2
INSPEC Accession Number: 10974744
Digital Object Identifier : [10.4108/ICST.MOBQUITOUS2009.6832](#)
Date of Current Version : 10 November 2009

[2] Wireless Medical Sensor Networks in Emergency Response: Implementation and Pilot Results

This paper appears in: [Technologies for Homeland Security, 2008 IEEE Conference on](#)
Issue Date : 12-13 May 2008
On page(s): 187 - 192
Location: Waltham, MA
Print ISBN: 978-1-4244-1977-7
INSPEC Accession Number: 10057563
Digital Object Identifier : [10.1109/THS.2008.4534447](#)
Date of Current Version : 30 May 2008

[3] Message Sending Method Using Patients' Priority for Medical Sensor Network

This paper appears in: [Distributed Computing Systems Workshops, 2009. ICDCS Workshops '09. 29th IEEE International Conference on](#)
Issue Date : 22-26 June 2009
On page(s): 194 - 200
Location: Montreal, QC
ISSN : 1545-0678
Print ISBN: 978-0-7695-3660-6
INSPEC Accession Number: 10762471
Digital Object Identifier : [10.1109/ICDCSW.2009.43](#)
Date of Current Version : 07 July 2009

[4] Secure health monitoring using medical wireless sensor networks

This paper appears in: [Networked Computing and Advanced Information Management \(NCM\), 2010 Sixth International Conference on](#)
Issue Date : 16-18 Aug. 2010
On page(s): 491 - 494
Location: Seoul
Print ISBN: 978-1-4244-7671-8
INSPEC Accession Number: 11530934
Date of Current Version : 16 September 2010

[5] Remote Healthcare Monitoring System Architecture using Sensor Networks

This paper appears in: [Region 5 Conference, 2008 IEEE](#)
Issue Date : 17-20 April 2008
On page(s): 1 - 6
Location: Kansas City, MO
Print ISBN: 978-1-4244-2076-6
INSPEC Accession Number: 10059647
Digital Object Identifier : [10.1109/TPSD.2008.4562760](#)
Date of Current Version : 15 July 2008