Patient Billing System

Version 1.0

**Team Members**

Ipsit Patra

Ghanshyam Bhatt

Parashar Pandya

Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Version** | **Description** | **Author** |
| 14/sep/08 | 1.0 | First Version of Apollo PBS | Ipsit Patra |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Table of Contents

1. Introduction 4

1.1 Purpose 5

1.2 Scope 5

1.3 Definitions, Acronyms and Abbreviations 5

1.4 References 5

1.5 Technologies to be used 5

1.6 Overview 6

2. Overall Description 7

2.1 Software Interface 8

2.2 Hardware Interface 8

2.3 Communication Interface 8

2.4 User Characteristics 8

2.5 Constraints 8

2.6 Product Function 9

2.7 Use-Case Model Survey 10

2.8 Database design 11

2.9 Table Descriptions 13

2.10 Architectural Design 20

2.11 Assumptions and Dependencies 23

3. Specific Requirements 24

3.1 Use-Case Reports 24

3.2 Supplementary Requirements 39

4. Concerns / Queries / Doubts if any: 40

# Introduction

The medical information of a patient is one of the most sensitive types of information. Medical information is collected from the moment a person is born until her death. Medical information typically includes aspects of a person’s physical health such as treatments, medicines and diagnoses. In addition to this health information, a medical record may also include information about substance abuse, sexual behavior, family relationships, and private thoughts expressed through psychotherapy. The Patient Treatment pattern focuses on the private and sensitive nature of this information and the need for maintaining accurate and organized records. This pattern describes only some of the aspects of patient treatment, which include the creation and maintenance of the patient record and the assignment of the assets for use by the patient. This pattern describes a general non-emergency treatment situation and does not consider the details of patient diagnosis and treatment.

 Patient billing system mainly deals with automating the various activities that are taking place within a hospital. This project is aimed at developing a patient billing software system that is of importance to a hospital.. This system can be used to maintain the location (bed no.) of each patient either in the ward or the ICU. Information about the patient and the charges to be paid is also stored.

      Existing patient information is already stored in the database. Any new patient information can be stored in the database via a patient information input screen. The screen will take as input all the details of the patient along with his health condition, the disease he is suffering from, the amount to be paid, the registration number, case number, etc.

      The hospital data entry operator should be able to: Login to the system through the first page of the application, Change the password after logging into the system, Enter / edit the organization code and address. Enter the ward number for the patient either in the general ward or the ICU, Settle all bills pending to be paid by a patient before the patient’s discharge.

## Purpose

Patient Billing System is for establishing and sustaining the business relationships by maintaining valuable Patient information. It also integrates the Support Desk, which gives an overall view of all the Patient relationships. The central repository enables to track account- level data, service level agreements, patient information and patient billing details.

## Scope

* Create different system users
* Manage all the new patient details such as Patient name, Doctors, Patient Identification numbers, address, email addresses of all the patient from one central location.
* Track all the Patient and Room number details(General Ward or the ICU Ward).
* Track all the payment details of the patient detail.

## Definitions, Acronyms and Abbreviations

* **HTML:** Hypertext Markup Language is a markup language used to design static web pages.
* **EJB:** Enterprise Java Beans.
* **J2EE:** Java 2 Enterprise Edition is a programming platform— part of the Java Platform—for developing and running distributed multitier architecture Java applications, based largely on modular software components running on an application server.
* **DB2**: DB2 Database is the database management system that delivers a flexible and cost effective database platform to build robust on demand business applications.
* **HTTP**: Hypertext Transfer Protocol is a transaction oriented client/server protocol between web browser & a Web Server.
* **HTTPS:** Secure Hypertext Transfer Protocol is a HTTP over SSL (secure socket layer).

## References

* IEEE SRS Format
* Problem Definition (Provided by IBM)
* CT Arrington. Enterprise Java with UML. OMG Press

## Technologies to be used

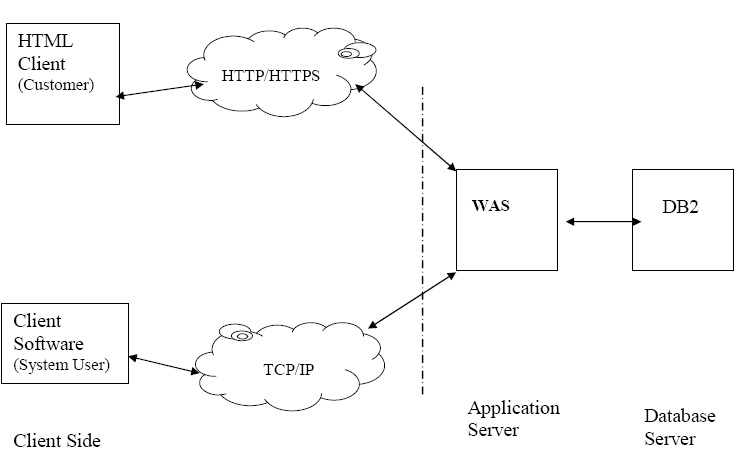
* J2EE: Application Architecture
* DB2: Database
* WAS: Web Server
* WSAD: Development Tool

## Overview

* ***Overall Description*** will describe major components of the system, interconnection and external interfaces.
* ***Specific Requirements*** will describe the functions of actors, their role in the system and constraints

# Overall Description

**Product Perspective:**



The web pages (XHTML/JSP) are present to provide the user interface on customer client-side. Communication between customer and server is provided through HTTP/HTTPS protocols.

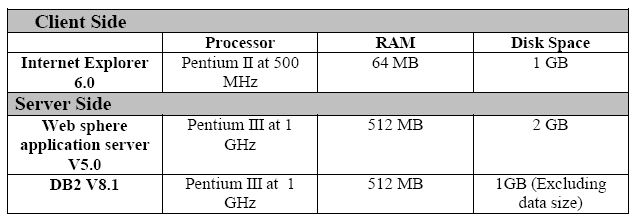
The Client Software is to provide the user interface on system user client side and for this TCP/IP protocols are used.

On the server side web server is for EJB and database server is for storing the information

## Software Interface:

* **Client on Internet:** Web Browser, Operating System (any)
* **Client on Intranet:** Client Software, Web Browser, Operating System (any)
* **Web Server:** WAS, Operating System (any)
* **Data Base Server:** DB2, Operating System (any)
* **Development End:** WSAD (J2EE, Java, Java Bean, Servlets, HTML), DB2, OS (Windows), Web Server.

## Hardware Interface:



## Communication Interface:

* Client on Internet will be using HTTP/HTTPS protocol.
* Client on Intranet will be using TCP/IP protocol.

## User Characteristics:

Every user should be comfortable of working with computer and net browsing. He must have basic knowledge of English too.

## Constraints:

* GUI is only in English.
* Login and password is used for identification of User and there is no facility for guest.
* This system is working for single server.
* There is no maintainability of back up so availability will get affected.
* Limited to HTTP/HTTPS

## Product Function:

1. **Track Account Level Data:** In this module, receivables from customer are maintained.
2. **Service Level Agreements:** It contains the agreements of providing the services related to product and customer.
3. **User Contact Information:** It maintains all the details (Personal, Official, Contact, and Company) of the customer.
4. **Product Ownership Details:** It maintains the information that does which customer own which product.
5. **Track Support Transactions:** Maintenance of transactions related to the services provided to the customer in the form of support.
6. **Maintaining Logs:** Activities of the System Users can be tracked through the logs, which are maintained by the system.

## Use-Case Model Survey

View room Details

Other users

View patient details

Manage Users and Passwords

View Accounts

Administrator

New patient

Room Status

Patient Treatment and Billing

Patient

His Treatment Details and Final Bill

1. **Administrator:** Responsible for application users, viewing accounts and managing users and their password of the system.

* **View Accounts:** Responsible for checking code and address of Entering / edit the organization code and address
* **Manage Uses and Password:** updating by the administrator, which will be visible to all the system users.
* **View patient details:** View the patient details, payment details, doctor assigned, daily service transaction details, and treatment details.
* **View room details:** View the room (General ward and ICU) Status, patient in room details, and daily service transaction details
* **Patient Treatment and Billing:** View the patient details, payment details, treatment details, and daily service transaction details
* **Room Status:** Keeps Track of Free bed in ICU and General ward and status of the occupied beds.
* **New Patient:** New Patient is admitted into the hospital and general details are filled and room status is updated

2. **Other Users:** Responsible for managing Patient and Room Status along with billing

* **View patient details:** View the patient details, payment details, doctor assigned, daily service transaction details, and treatment details.
* **View room details:** View the room (General ward and ICU) Status, patient in room details, and daily service transaction details
* **Patient Treatment and Billing:** View the patient details, payment details, treatment details, and daily service transaction details
* **Room Status:** Keeps Track of Free bed in ICU and General ward and status of the occupied beds.
* **New Patient:** New Patient is admitted into the hospital and general details are filled and room status is updated

## Database design

Receptionist

ISA

Receptionist

System\_User

Ad id

Name ad

AD Passwd

C passwd

Doctor Details

D id

D Name

D spec

D add

D phone

D fee

P app time

Patient Detail

P id

P Name

P age

P sex

P add

P ph no.

P ad date

P ad time

P blood

Ward Fee

F a/c

F non a/c

F icu

Assigned

IN

Fee

Ward details

No. B a/c

No. B non a/c

No. B icu

Allot. B a/c

Allot B non a/c

Allot B icu

rem. B a/c

rem B non a/c

rem B icu

Bill Detail

P id

D id

T perf

T fee

Treat under

Crs dur

Treat fee

W allot

W fees

M bill

Bill Detail

P id

P name

P age

P sex

P add

P ph no.

D id

D Name

D add

D phone

T perf

T fee

Treat fee

Crs dur

D fee

W allot

W fees

M bill

T bill

Billing

Ward fee

Treatment fee

## Table Descriptions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Table No.: | 1 | | | | | |
| Table Name: | administrator login details | | | | | |
| Table Description: | Maintains all the login details of the administrator  in **patient** **billing** **system**. | | | | | |
| Seq. # | Column Name | Column Description | Column Type | PK/FK? | Null/Not Null | Remarks |
|  |  |  |  |  |  |  |
| 1 | Name ad | Name of the administrator | Varchar |  |  |  |
| 2 | Ad id | administrator id | Varchar | pk |  |  |
| 3 | Ad passwd | Administrator password | Varchar |  |  |  |
| 4 | C passwd | Change password after login | Varchar |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Table No.: | | 2 | | | | | |
| Table Name: | | Patient details | | | | | |
|
| Table Description: | | Maintains all the details of the patients in  **patient** **billing** **system**. | | | | | |
| Seq. # | Column Name | | Column Description | Column Type | PK/FK? | Null/ | Remarks |
|  |
| Not Null |
| 1 | P id | | Patient id | varchar | pk |  |  |
| 2 | P name | | Patient name | Varchar |  |  |  |
| 3 | P age | | Patient age | Integer |  |  |  |
| 4 | P sex | | Sex of **patient** | Varchar |  |  |  |
| 5 | P add | | Address of the **patient** | varchar |  |  |  |
| 6 | P ph no. | | Patient phone no. | Integer |  |  |  |
| 7 | P ad date | | **Patient** admit date | varchar |  |  |  |
| 8 | P ad time | | **Patient** admit time | varchar |  |  |  |
| 9 | P blood | | **Patient** Blood group | varchar |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No.: | | 3 | | | | | |
| Table Name: | | Doctor details | | | | | |
|
| Table Description: | | Maintains all details of the consultant doctor  in **patient** **billing** **system**. | | | | | |
| Seq. # | Column Name | | Column Description | Column Type | PK/FK? | Null/ | Remarks |
|  |
| Not Null |
| 1 | D id | | Doctor id | varchar | pk |  |  |
| 2 | D name | | Doctor name | varchar |  |  |  |
| 3 | D spec | | Specialization of doctor | varchar |  |  |  |
| 4 | D add | | Doctor address | varchar |  |  |  |
| 5 | D phone | | Phone no. of  doctor | integer |  |  |  |
| 6 | D fee | | Doctor fees | integer |  |  |  |
| 7 | D app time | | doctor appointment timings | varchar |  |  |  |
|  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Table No.: | | 4 | | | | | |
| Table Name: | | Ward details | | | | | |
|
| Table Description: | | Maintains the details of all the wards. | | | | | |
| Seq. # | Column Name | | Column Description | Column Type | PK/FK? | Null/ | Remarks |
|  |
| Not Null |
| 1 | No.B a/c | | No. of beds in a/c ward | integer | Pk |  |  |
| 2 | No.B non a/c | | No. of beds in Non a/c ward | integer | Pk |  |  |
| 3 | No.B icu | | No. of beds in                   ICU ward | integer | Pk |  |  |
| 4 | Allot  B a/c | | No. of beds allotted in a/c | integer | Pk |  |  |
| 5 | Allot  B non a/c | | No. of beds allotted in non a/c | integer | Pk |  |  |
| 6 | Allot  B icu | | No. of beds allotted in ICU | integer | Pk |  |  |
| 7 | rem B a/c | | No. of beds remained in a/c | integer | Pk |  |  |
| 8 | rem  B non a/c | | No. of beds remained in non a/c | integer | Pk |  |  |
| 9 | rem  B icu | | No. of beds remained in ICU | integer | Pk |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Table No.: | | 5 | | | | | |
| Table Name: | | Ward fee details | | | | | |
|
| Table Description: | | Maintains all details of the ward fee  in **patient** **billing** **system**. | | | | | |
| Seq. # | Column Name | | Column Description | Column Type | PK/FK? | Null/ | Remarks |
|  |
|  |
| 1 | F a/c | | a/c ward fee | integer | Pk |  |  |
| 2 | F non a/c | | Non a/c ward fee | integer | Pk |  |  |
| 3 | F icu | | Icu ward fee | integer | Pk |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Table No.: | | 6 | | | | | |
| Table Name: | | Billing details | | | | | |
|
| Table Description: | | Maintains all the billing of the patient in patient billing system. | | | | | |
| Seq. # | Column Name | | Column Description | Column Type | PK/FK? | Null/ | Remarks |
|  |
| Not Null |
| 1 | P id | | Patient id | varchar | Pk/fk |  |  |
| 2 | D id | | Doctor id. | Varchar | Pk/fk |  |  |
| 3 | T perf | | Tests performed. | Varchar |  |  |  |
| 4 | T fee | | Test fees | Integer |  |  |  |
| 5 | Treat under | | Treatment undergone | Varchar |  |  |  |
| 6 | Crs dur | | Course duration | Integer |  |  |  |
| 7 | Treat fee | | Treatment fees | Integer |  |  |  |
| 8 | W allot | | Ward allotted | Varchar | pk |  |  |
| 9 | W fees | | Ward fees | integer | Pk/fk |  |  |
| 10 | M bill | | Medicine bill | integer |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Table No.: | | 7 | | | | | |
| Table Name: | | Total billing details | | | | | |
|
| Table Description: | | Maintains all the billing of the patient in patient billing system. | | | | | |
| Seq. # | Column Name | | Column Description | Column Type | PK/FK? | Null/ | Remarks |
|  |
| Not Null |
| 1 | P id | | Patient id | varchar |  |  |  |
| 2 | P name | | Patient name | varchar |  |  |  |
| 3 | P age | | Patient age | Integer |  |  |  |
| 4 | Psex | | Sex of the **patient** | varchar |  |  |  |
| 5 | P add | | Address of the **patient** | Varchar |  |  |  |
| 6 | P ph.no. | | Patient phone no. | integer |  |  |  |
| 7 | D id | | Doctor id. | Varchar |  |  |  |
| 8 | D name | | Doctor name | Varchar |  |  |  |
| 9 | D add | | Doctor address | Varchar |  |  |  |
| 10 | D ph.no | | Doctor phone no. | integer |  |  |  |
| 11 | T perf | | Tests performed. | Varchar |  |  |  |
| 12 | T fee | | Test fees | Integer |  |  |  |
| 13 | Treat fee | | Treatment fees | integer |  |  |  |
| 14 | Crs dur | | Course duration | Integer |  |  |  |
| 15 | D fee | | Doctor fees | Integer |  |  |  |
| 16 | W allot | | Ward allotted | varchar |  |  |  |
| 17 | W fees | | Ward fees | integer |  |  |  |
| 18 | M bill | | Medicine bill | integer |  |  |  |
| 19 | T bill | | Total bill | integer |  |  |  |

## Architecture diagram

**Level 1**

DFD



Patient Info

Patient Bill Info

Main Option

Search

Patient and room details

Hospital

Details and accounts

Patient and room info

New patient or updates for patient/ rooms

Searched patient

Login request

User\_Id and Password

1

Login

Doctor/Receptionist

Login Details

Password Change of users/

Edit organization Address

Change account details

Final Check-out Bill

Patient

Billing

Department

2

Patient Billing Details

Billing Info

Patient Number

And Amount & Cost

5

Patient+ Room Information

6

3

4

Generate

Bill

**Level 2**

Patient Bill Update

Room details

Patient and room info

New patient or updates for patient/ rooms

Search

4



Searched patient

Patient Info

Room Availability

Room Info

change account info

Patient

Details

5.2

Room

Details

(GW/ICU)

5.1

Main Option

2

Login request

User Id and Password

1

Login

Doctor/Receptionist

Login Details

New session

Changing code

And address

Password Change and new users

Password change

3.2

Hospital

Details and accounts

3.1

Code and Address change

3.3

Code and Address Details

Billing Info

Patient Billing Details

6

Generate

Bill

Patient

Billing

Department

Final Check-out Bill

Patient Number

And Amount & Cost

Patient+ Room Information

5.2

## Assumptions and Dependencies

* The details related to the User, Patients, Room Details, payment and service transaction provided manually.
* Administrator is created in the system already.
* Roles and tasks are predefined.

# Specific Requirements

## Use-Case Reports

View room Details

Other users

View patient details

Manage Users and Passwords

View Accounts

Administrator

New patient

Room Status

Patient Treatment and Billing

1. **Administrator:** Responsible for application users, viewing accounts and managing users and their password of the system.

* **View Accounts:** Responsible for checking code and address of Entering / edit the organization code and address.
* **Manage Uses and Password:** updating by the administrator, which will be visible to all the system users.
* **View patient details:** View the patient details, payment details, doctor assigned, daily service transaction details, and treatment details.
* **View room details:** View the room (General ward and ICU) Status, patient in room details, and daily service transaction details
* **Patient Treatment and Billing:** View the patient details, payment details, treatment details, and daily service transaction details
* **Room Status:** Keeps Track of Free bed in ICU and General ward and status of the occupied beds.
* **New Patient:** New Patient is admitted into the hospital and general details are filled and room status is updated.

New patient

Room Status

Patient Treatment and Billing

Manage Users and Passwords

View Accounts

Administrator

View room Details

View patient details

**Name of use case:** View Accounts

**Description:** View the system using Hospital’s detail and changing code or address details.

**Preconditions:**

Administrator is already logged in.

**Normal flow of events:**

Account updated

Query will be submitted.

**Alternate flow of events:** None.

**Post Condition:** None

Error Display

Ask for New Code or address

Add specific information

Display Change

Store changes

Fail

**Name of use case:** Manage Users and Passwords

**Description:** Changing password and maintaining user passwords

**Preconditions:**

Administrator is already logged in.

System users have already been created and assigned some roles, tasks and permissions.

**Normal flow of events:**

* The system user or a role will be selected.
* Query will be submitted.
* Relevant output will be displayed.

**Alternate flow of events:** None.

**Post Condition:** None

Enter old password

And the new password

Password Change Successfully

Invalid

**Name of use case:** Room Status

**Description:** View the list of Rooms allotted and Rooms/Wards free.

**Preconditions:**

User or Administrator is already logged in.

**Normal flow of events:**

The system user or a role will be selected.

Query will be submitted.

Relevant output will be displayed

**Alternate flow of events:** None.

**Post Condition:** None

No Ward Available

Show Update

Get details and update ward Status

Patient Request

Store Data

**Name of use case:** New patient

**Description:** New Patient entry is made, ward and assigned

**Preconditions:**

User or Administrator is already logged in.

**Normal flow of events:**

* Query will be submitted.
* New Account created
* Relevant output will be displayed.

**Alternate flow of events:** None.

**Post Condition:** None

Store Data

Get details

New patient

Invalid

**Name of use case:** Patient Treatment and Billing

**Description:** View Details of the patient’s treatment, ward billing

**Preconditions:**

Administrator is already logged in.

**Normal flow of events:**

* The patient will be selected.
* Query will be submitted.
* Relevant output will be displayed

**Alternate flow of events:** None.

**Post Condition:** None

Patient checked out

Print info if needed

Get treatment details and ward Status

Patient Details Request

Show required info

**Name of use case:** View Room Details

**Description:** View the list of Ward (ICU A/C and none A/C) Free and allotted to the patient

**Preconditions:**

Administrator is already logged in.

**Normal flow of events:**

* The system user or a role will be selected.
* Query will be submitted.
* Relevant output will be displayed

**Alternate flow of events:** None.

**Post Condition:** None

Ask for Room

Display free Wards

Display Details of the room

Store changes

**Name of use case:** View Patient Details

**Description:** View the list of patient’s admitted to the hospital with their current treatment and ward information

**Preconditions:**

Administrator is already logged in.

**Normal flow of events:**

The system user or a role will be selected.

Query will be submitted.

Relevant output will be displayed.

**Alternate flow of events:** None.

**Post Condition:** None

Ask for Patient

Next detail

Display Details of the patient

Store changes

2. **Other Users:** Responsible for managing Patient and Room Status along with billing

* **View patient details:** View the patient details, payment details, doctor assigned, daily service transaction details, and treatment details.
* **View room details:** View the room (General ward and ICU) Status, patient in room details, and daily service transaction details
* **Patient Treatment and Billing:** View the patient details, payment details, treatment details, and daily service transaction details
* **Room Status:** Keeps Track of Free bed in ICU and General ward and status of the occupied beds.
* **New Patient:** New Patient is admitted into the hospital and general details are filled and room status is updated

New patient

Room Status

Patient Treatment and Billing

View room Details

Other users

View patient details

**Name of use case:** Room Status

**Description:** View the list of Rooms allotted and Rooms/Wards free.

**Preconditions:**

User or Administrator is already logged in.

**Normal flow of events:**

The system user or a role will be selected.

Query will be submitted.

Relevant output will be displayed

**Alternate flow of events:** None.

**Post Condition:** None

No Ward Available

Show Update

Get details and update ward Status

Patient Request

Store Data

**Name of use case:** New patient

**Description:** New Patient entry is made, ward and assigned

**Preconditions:**

User or Administrator is already logged in.

**Normal flow of events:**

* Query will be submitted.
* New Account created
* Relevant output will be displayed.

**Alternate flow of events:** None.

**Post Condition:** None

Store Data

Get details

New patient

Invalid

**Name of use case:** Patient Treatment and Billing

**Description:** View Details of the patient’s treatment, ward billing

**Preconditions:**

Administrator is already logged in.

**Normal flow of events:**

* The patient will be selected.
* Query will be submitted.
* Relevant output will be displayed

**Alternate flow of events:** None.

**Post Condition:** None

Patient checked out

Print info if needed

Get treatment details and ward Status

Patient Details Request

Show required info

**Name of use case:** View Room Details

**Description:** View the list of Ward (ICU A/C and none A/C) Free and allotted to the patient

**Preconditions:**

Administrator is already logged in.

**Normal flow of events:**

* The system user or a role will be selected.
* Query will be submitted.
* Relevant output will be displayed

**Alternate flow of events:** None.

**Post Condition:** None

Ask for Room

Display free Wards

Display Details of the room

Store changes

**Name of use case:** View Patient Details

**Description:** View the list of patient’s admitted to the hospital with their current treatment and ward information

**Preconditions:**

Administrator is already logged in.

**Normal flow of events:**

The system user or a role will be selected.

Query will be submitted.

Relevant output will be displayed.

**Alternate flow of events:** None.

**Post Condition:** None

Ask for Patient

Next detail

Display Details of the patient

Store changes

## Supplementary Requirements

## Have hours of operation that are 24 x 7

Because system can be an automated process, so it can stay open for 24 hours a day. If the base is now the entire world, staying open 24 hours a day becomes critical. System is required to be available 24X7 so UPS support must be on server site for at least 8 hours in case of power failure. System will remain inaccessible to users at 2:00 to 4:00 am for backup and maintenance purpose.

## Make the existing Web site more dynamic in nature

Many early Web implementations consisted of static HTML pages. This becomes very difficult to manage if the number of pages gets too large. An effective system should be largely dynamic taking dvantage of technology that automates this process rather than relying on manual processes. Application should serve dynamic user based customized web pages to its clients from server.

## Tie the existing Web site into existing enterprise systems

Any existing Web site that relies on the manual duplication of data from another system is one that can be improved. Most of the business data in the world today exists in enterprise servers that can be connected to the Web servers to make this process far more effective.

## Provide good performance and the ability to scale the server

The Web Application Server should provide good performance and the ability to manage performance with techniques, such as support for caching, clustering, and load balancing.

## Providing session management capability

Web application developers should not spend valuable time worrying about how to maintain sessions within the application. The Web Application Server should provide these services.

# Concerns / Queries / Doubts if any:

NONE