SOFTWARE ENGINEERING

E healthcare System

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1 Introduction

This document is designed to be a reference for any person wishing to implement or any person interested in the architecture of thee healthcare application. This document describes each application's architecture and sub-architecture their associated interfaces, database schemas, and the motivations behind the chosen design. Both high-level and low-level designs are included in this document.

This document should be read by an individual with a technical background and has experience reading data flow diagrams (DFDs), control flow diagrams (CFDs), interface designs, and development experience in object oriented programming and event driven programming.

This design document has an accompanying specification document and test document. This document includes but is not limited to the following information :the system overview, design considerations, architectural strategies, system architecture, policies and tactics, and detailed system design.

1.1 Purpose

The purpose of this Software Design Document is to describe the specific design of the E-Healthcare management System. The design specification includes an overview of the design along with software module decomposition. This document provides a detailed description of each software module's design. For each module, a user interface design and class diagram design is given. As well, a process description is described for each module. It is in the process description that the details of what logic will need to be implemented are given.

1.2 Scope

It is within the scope of the Software Design Document to describe the specific system design of the this system. This would include user interface design, object-oriented class design, process design, and data design. Any specific detail that is needed about the standards or technology used to design the software are within the scope of this document.

1.3 Definitions and Acronyms

Table of Definitions, Acronyms, and Abbreviations

Definition, Acronym, or Abbreviation	Description
SDS	Software Design Specification.

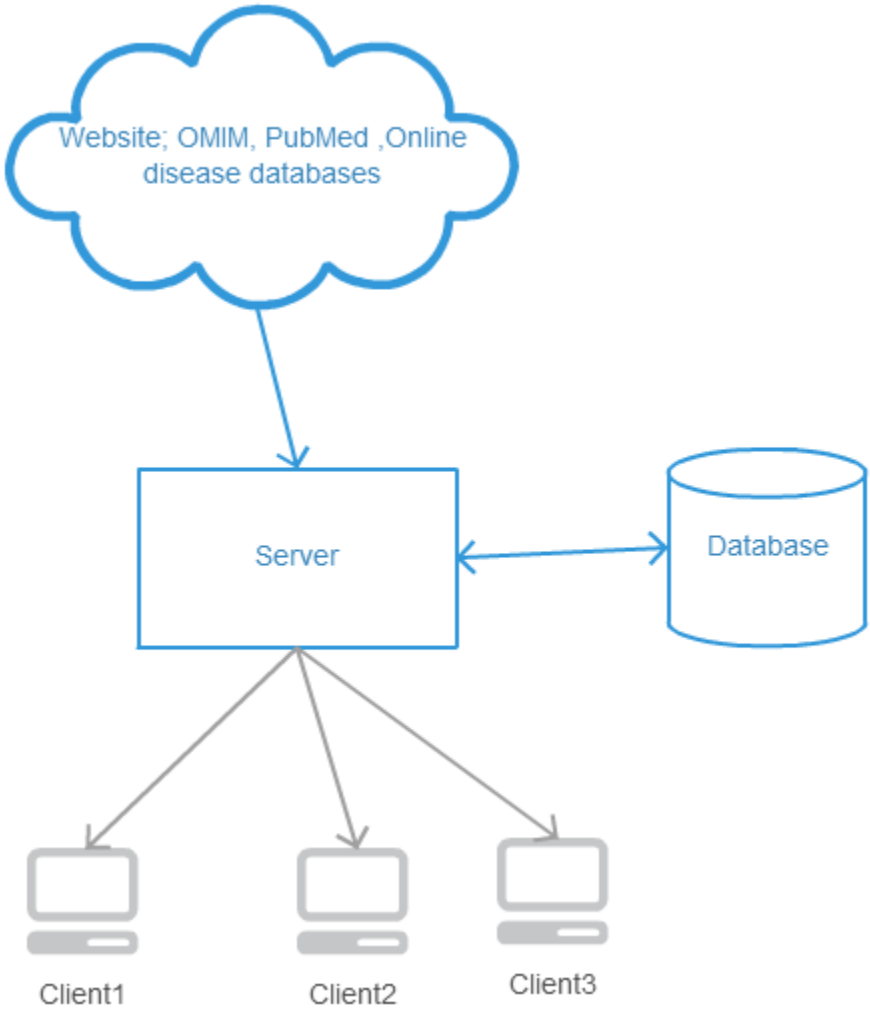
1.4 References

References	Description
Software Project Plan	The Software Development Plan from the Electronic Stamp project was referenced.
Software Requirements Specification	The Software Requirements Specification from the Electronic Stamp project was referenced.

2 System Overview

E-HealthCare Management System is powerful, flexible, and easy to use Web Application which is designed and developed to deliver large benefits to hospitals. E-HealthCare Management System is perfectly fits the requirements of multi-specialty hospitals that have a wide range of hospital administration and management processes. It integrates all the paperwork of different department's l to support effective decision making for patient care, hospital administration, and critical financial accounting, in a seamless flow.

The Application can be used by Patients, Doctors, Medical and managerial staff. The application accesses external databases to keep doctors up to date about latest development in the field of any disease.

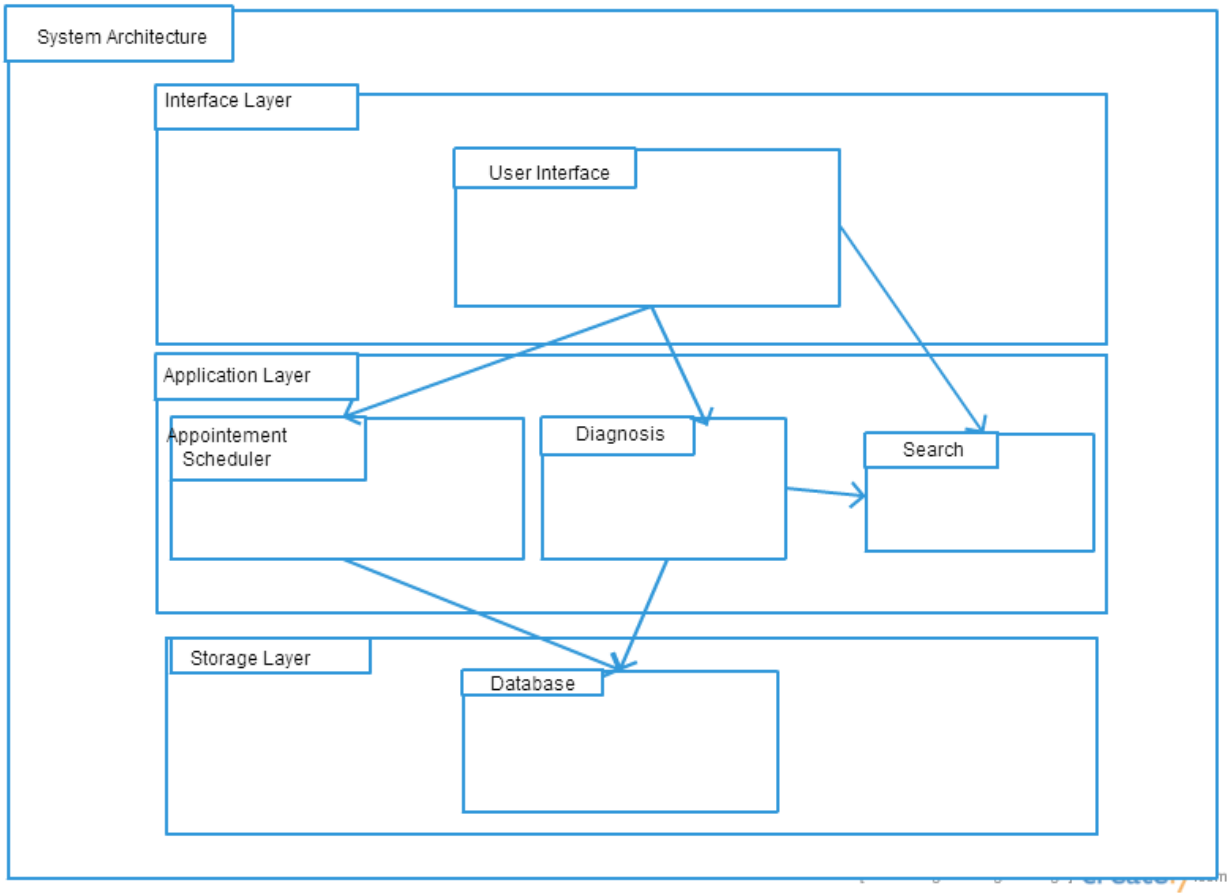


3 System Architecture

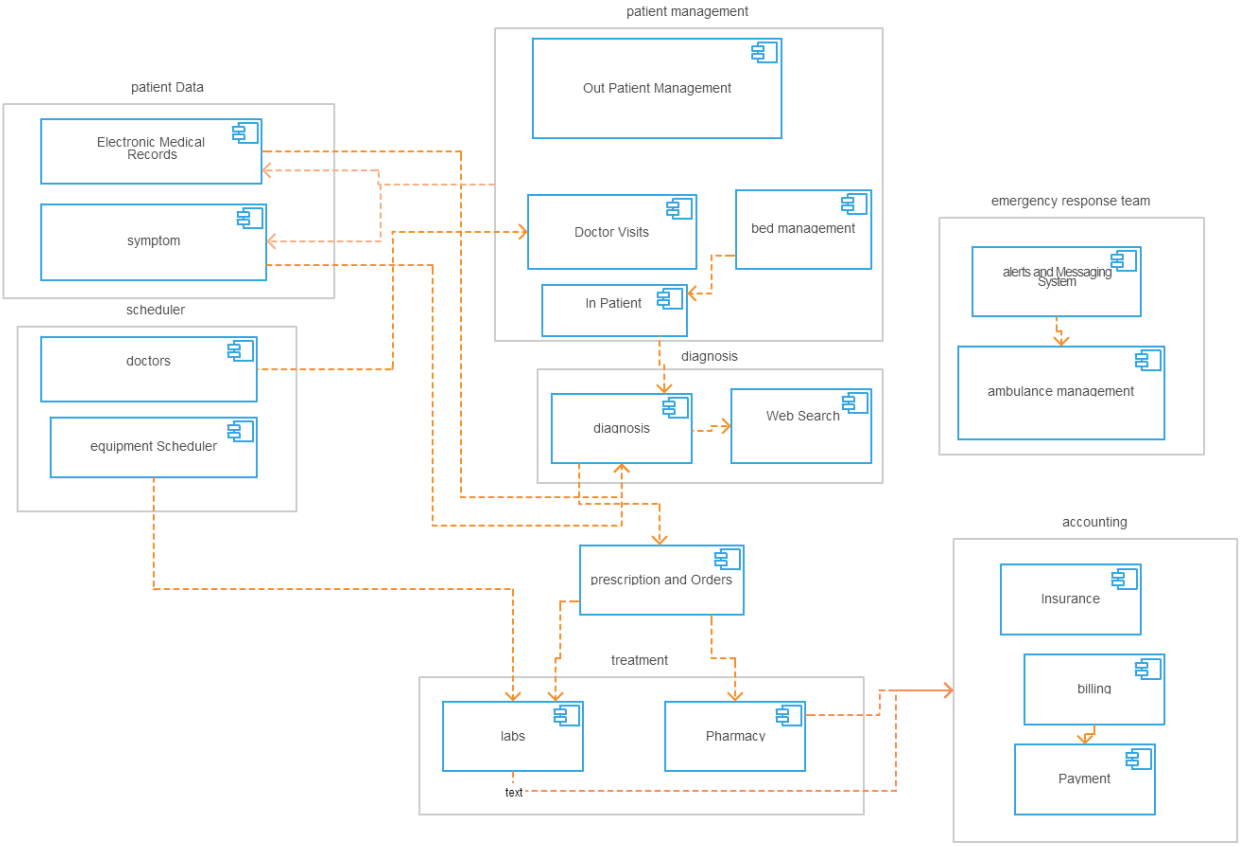
3.1 Architecture Design

Since this E-healthcare management System is a web application, Client Server Architecture is chosen with a datacentric approach where there is a central storage database and multiple no. of users can retrieve, modify ,add or delete data from it

depending on user priviliges.

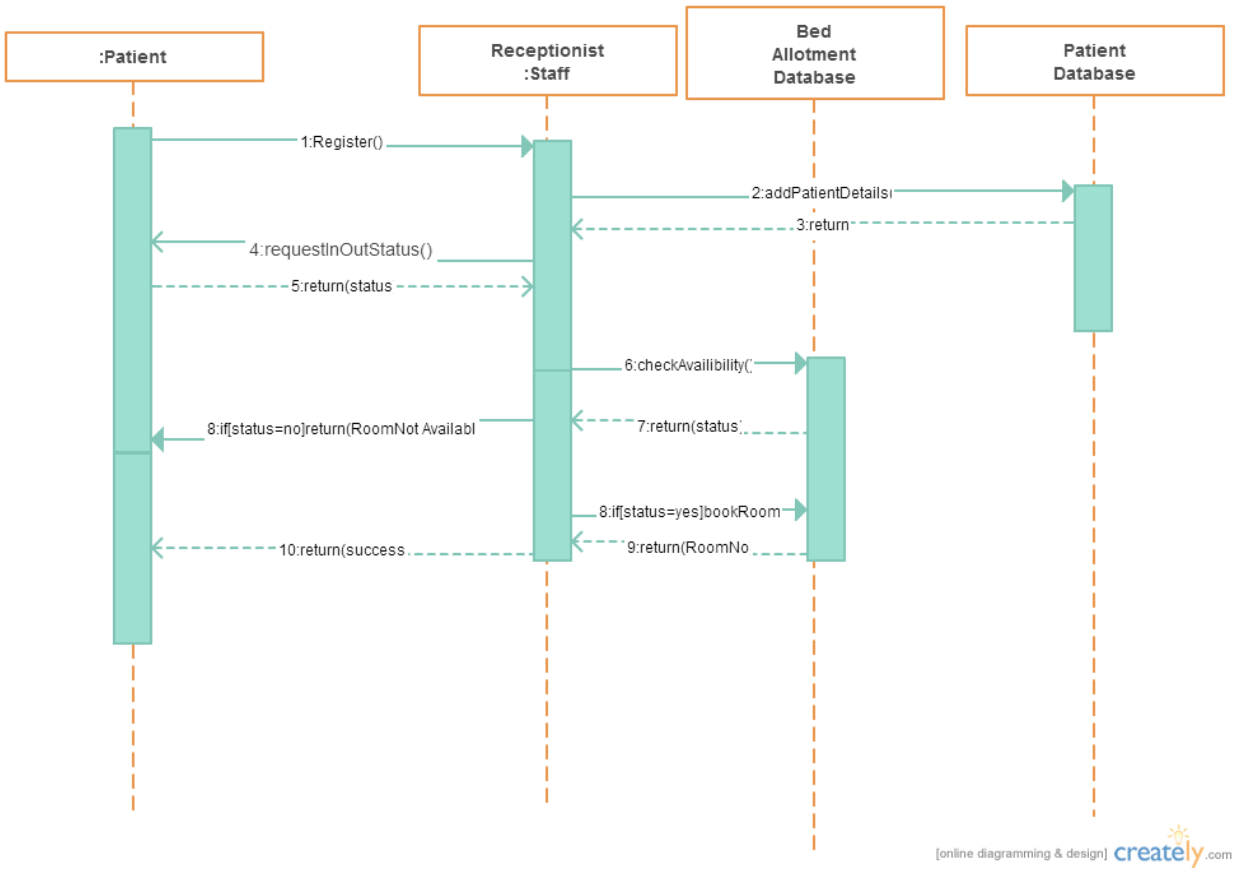


System Architecture Design High Level Design



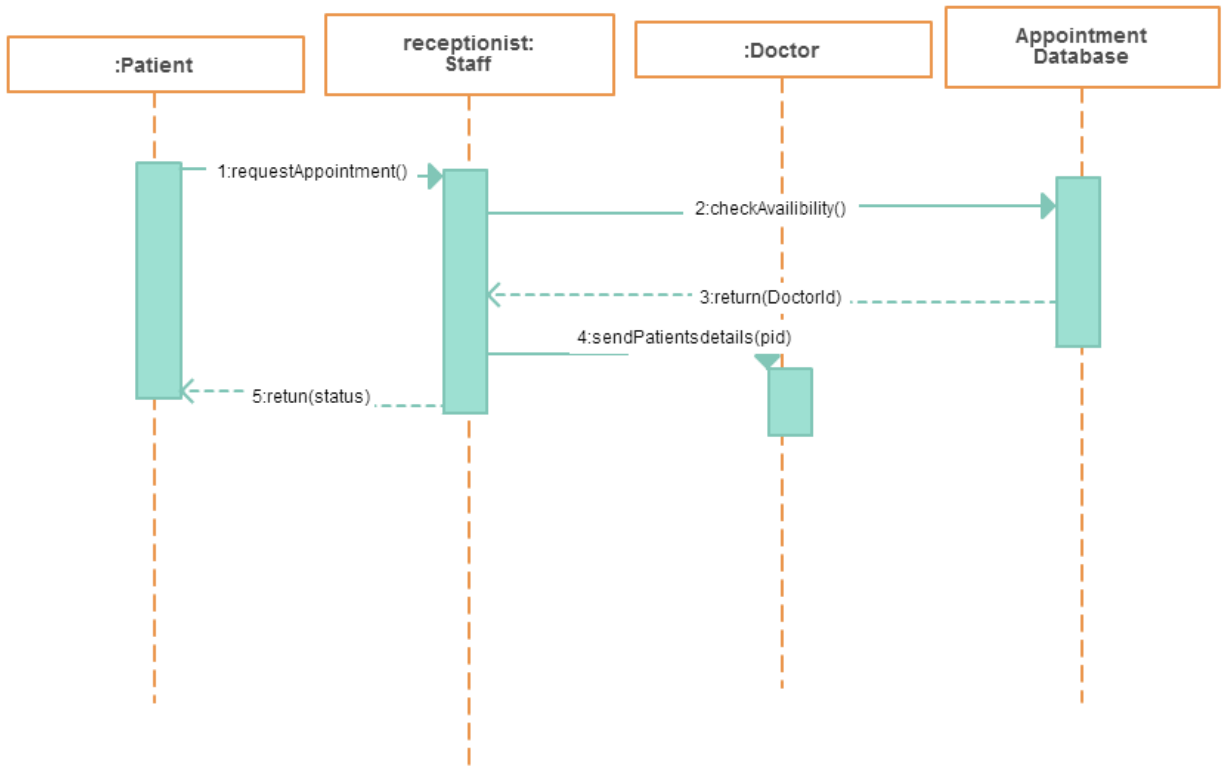
3.2 Decomposition Description

Following are the sequence diagrams for major activities of the system.
Patient Registration and In-patient Room Allotment



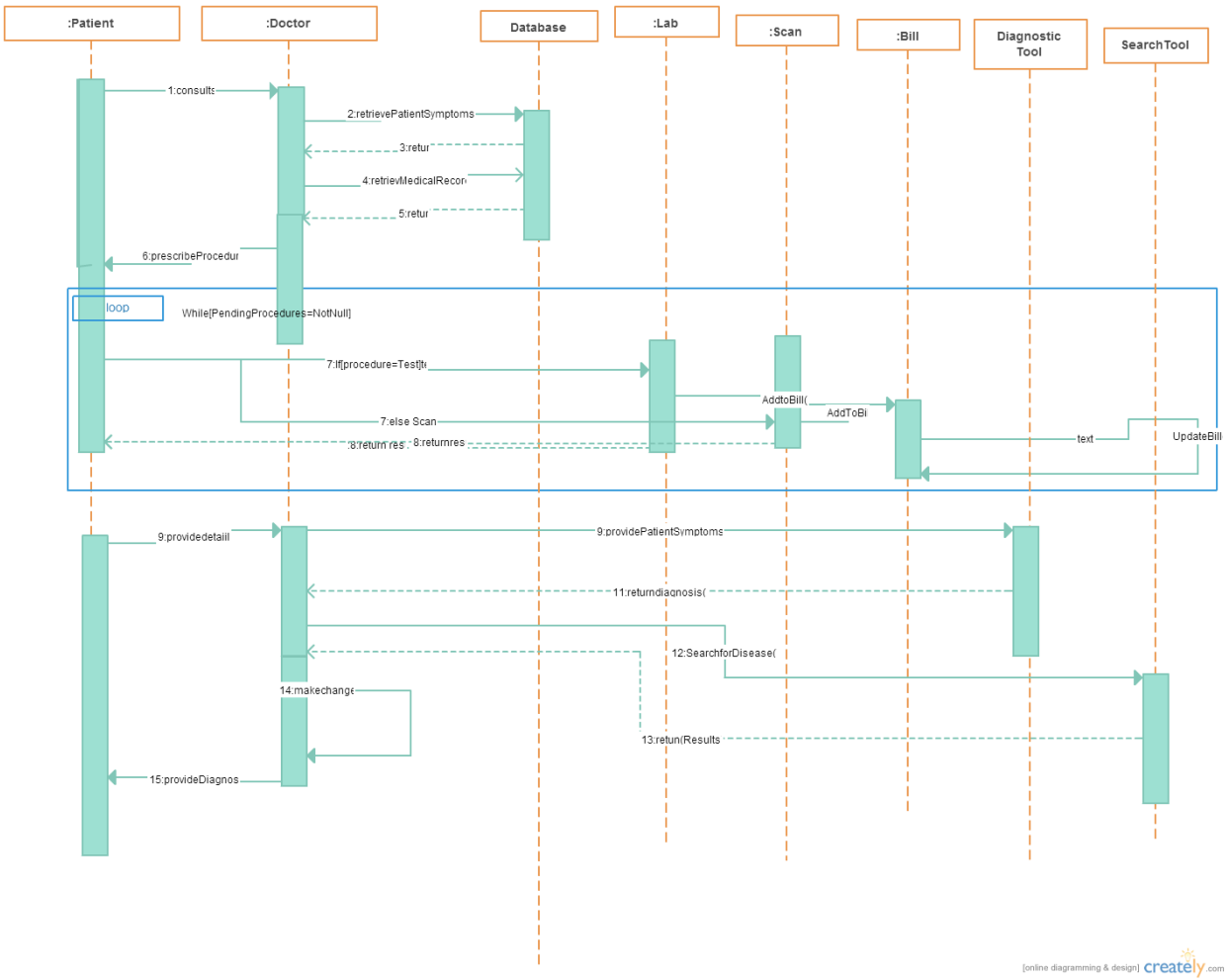
To allot a room a receptionist has to check for the available rooms in the ward database and book a room only if an empty room is available. On successful registration, the Room no. and Bed No. should be returned to the patient.

Appointment



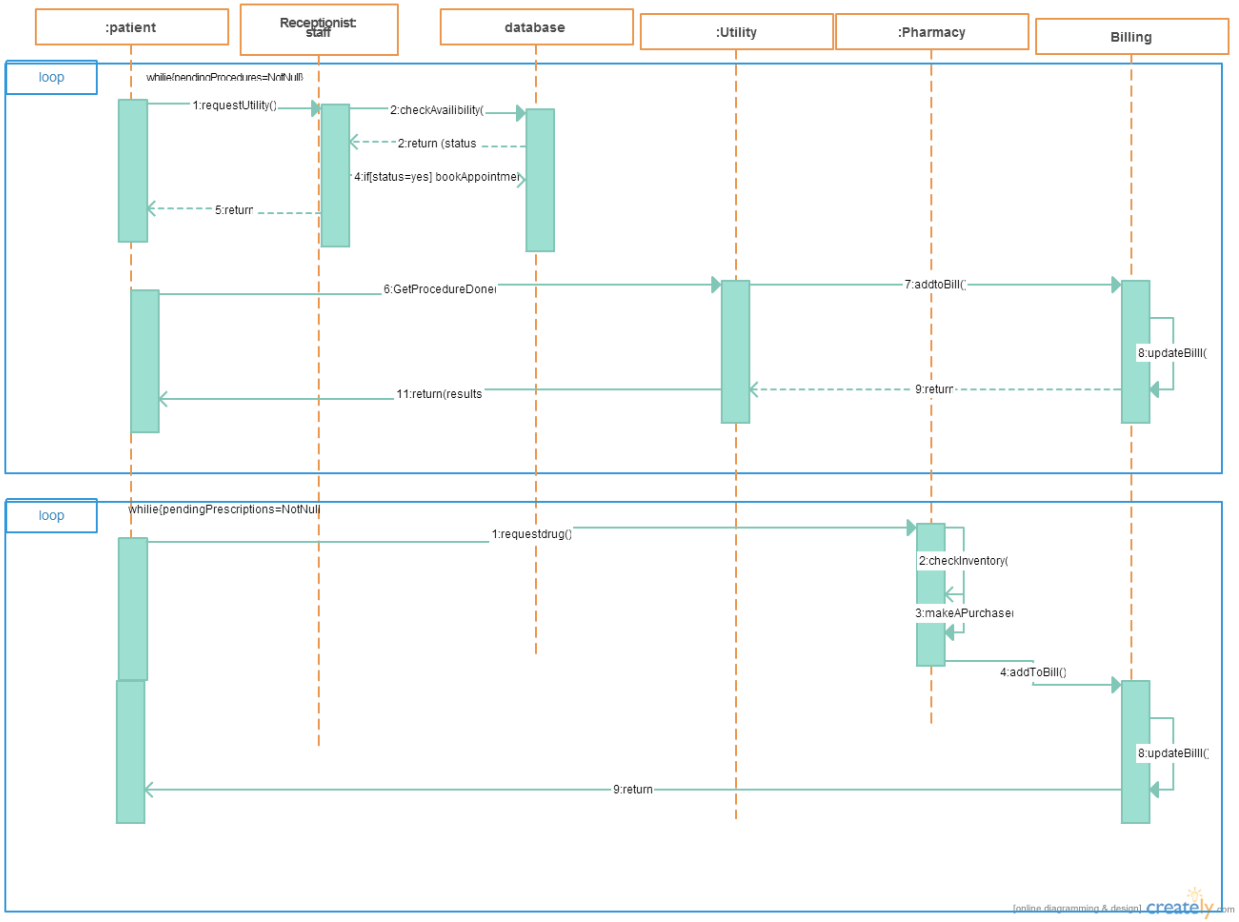
To get an Appointment a patient has to request an appointment at the reception where receptionist check the availability of a suitable doctor and returns the venue and doctor name if available.

Diagnosis

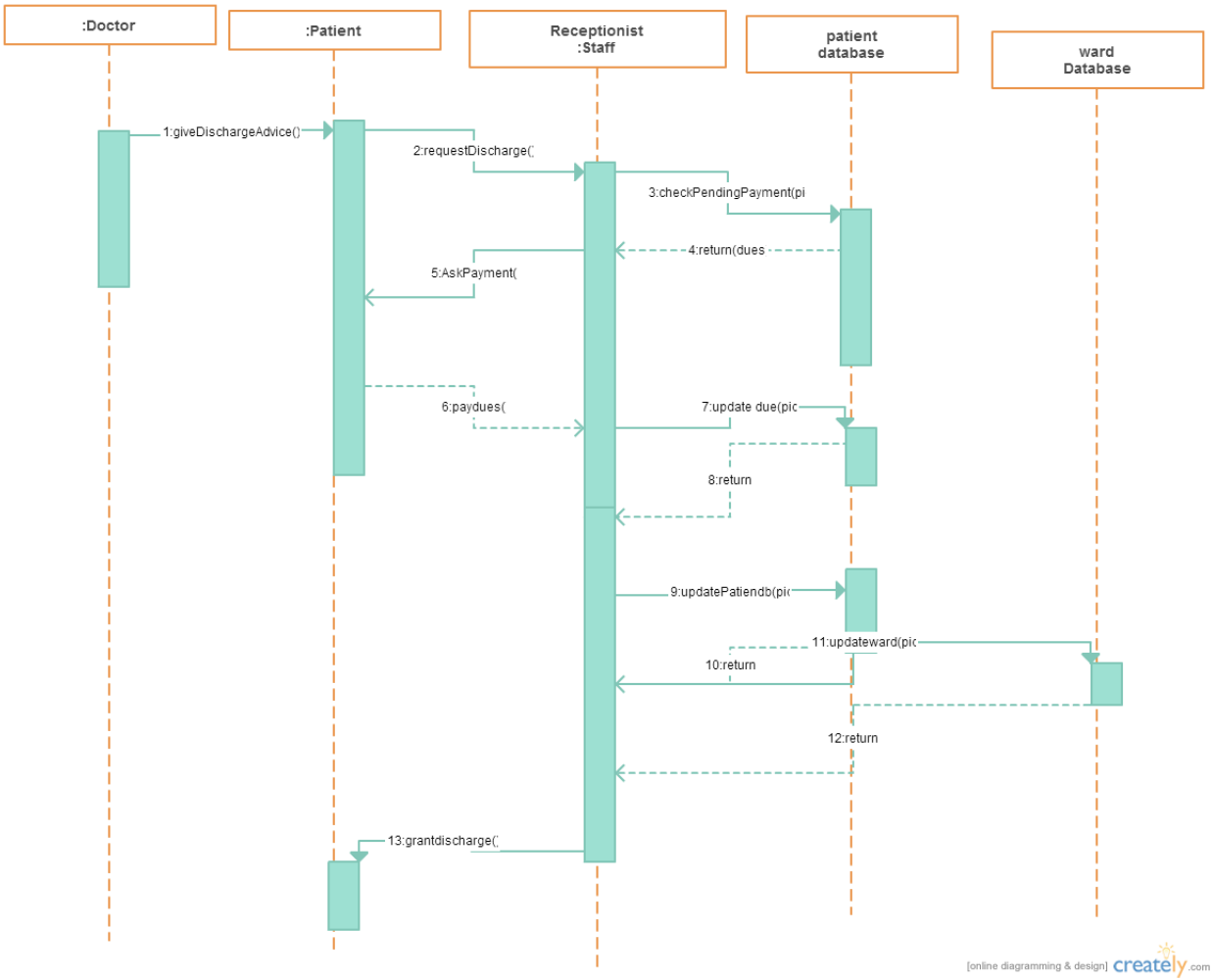


For diagnosis patient has to submit is symptoms and EMR to the doctor. A doctor can use the online diagnosis system to get an indicative diagnosis and if necessary make changes to it. He can also search the external online medical databases like Pubmed and OMIM to keep himself updated with latest advances in the field of that particular diseases.

Prescription and Order


:patient
Receptionist staff
database
:Utility
:Pharmacy
Billing
loop
whilie(pendingProcedures=NotNull)
1:requestUtility()
2:checkAvailibility(
2:return (status
4:if[status=yes] bookAppointment
5:return
6:GetProcedureDone
7:addtoBill(
8:updateBill(
9:return
11:return(results
loop
whilie(pendingPrescriptions=NotNull)
1:requestdrug()
2:checkInventory(
3:makeAPurchase
4:addToBill()
8:updateBill(
9:return
[online diagramming & design] creately.com

Discharge



A patient is granted discharge only after all the dues have been paid by him.

3.3 Design Rationale

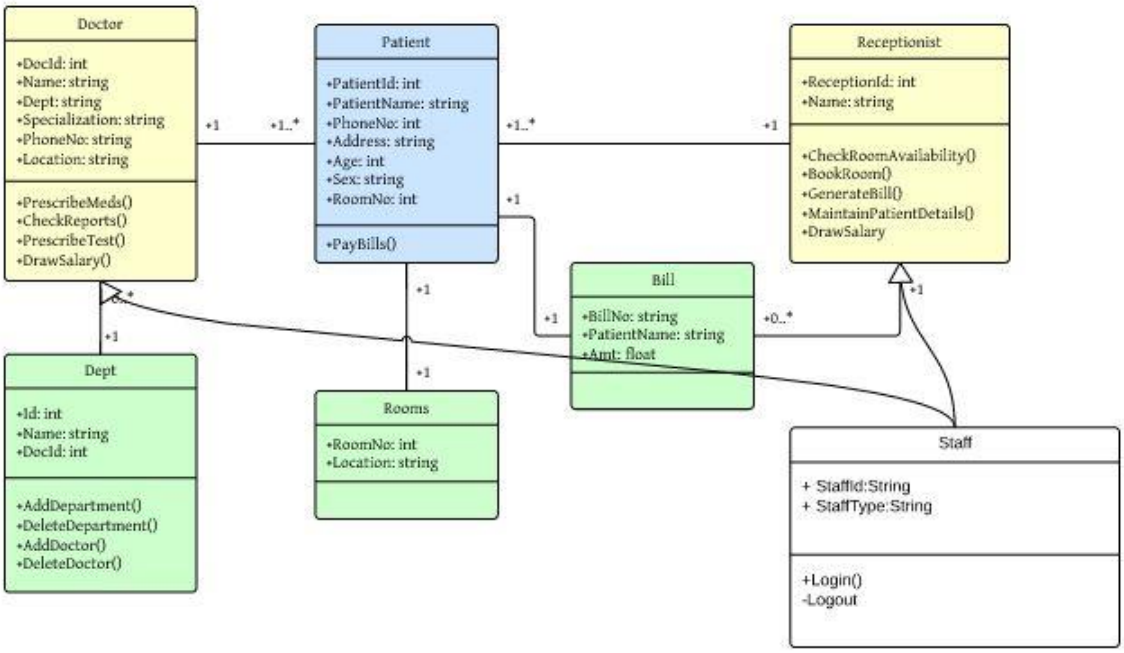
We have chosen a data centric client Server architecture because the application would be used by multiple no. of users at the same time. Therefore it is necessary to take care of concurrency and other issues. Also all these users should be able to add, modify and delete data from a database according their privileges.

4 Data Design

4.1 Data Description

The following is the class diagram that shows major entity if present in the system along with their data and functionalities and how they interact with each other.

Class Diagram



4.2 Data Dictionary

This subsection explains how data is stored in the system.Each table is followed by a description of their indices.

4.2.1 Appointments-A table to store the appointments.

Column	Type	Null	Default
doctor_no	int(11)	No	
patient_no	int(11)	No	
Date	Date	No	
Time	int(4)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
patient_no	BTREE	No	No	patient_no	0	A	No	
doctor_no	BTREE	No	No	doctor_no	0	A	No	

4.2.2 Causes-A table that links diseases with symptoms.

Column	Type	Null	Default
disease_id	int(11)	No	
symptom_id	int(11)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
disease_id	BTREE	No	No	disease_id	20	A	No	
symptom_id	BTREE	No	No	symptom_id	62	A	No	

4.2.3 Department –A table to strore the various department details of a hospital

Column	Type	Null	Default
dept_id *(Primary)*	int(2)	No	
dept_name	varchar(20)	No	
dept_head	int(11)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	dept_id	0	A	No	
dept_head_fk	BTREE	No	No	dept_head	0	A	No	

4.2.4 Diseases-A table of diseases

Column	Type	Null	Default
Disease	varchar(30)	No	
id *(Primary)*	int(11)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Id	13	A	No	id_pk

4.2.5 Doctors-

Column	Type	Null	Default

staff_no *(Primary)*	int(11)	No	
edu_qualf	varchar(20)	Yes	*NULL*
lic_no	char(10)	No	
Ssn	char(10)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	staff_no	0	A	No	
Ssn	BTREE	Yes	No	Ssn	0	A	No	

4.2.6 Healthrecord-Table that stores the health record and procedures done on them

Column	Type	Null	Default
patient_no	int(11)	No	
ssn_no	char(10)	No	
Date	Date	No	
description	varchar(30)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
ssn_no	BTREE	No	No	ssn_no	0	A	No	
patient_no	BTREE	No	No	patient_no	0	A	No	

4.2.7 Lab-

Column	Type	Null	Default
lab_id *(Primary)*	int(11)	No	
lab_name	varchar(20)	No	
dept_id	int(11)	No	
Incharge	int(11)	No	

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	lab_id	0	A	No	
dept_id_fk	BTREE	No	No	dept_id	0	A	No	
incharge_fk	BTREE	No	No	incharge	0	A	No	

4.2.8 Patient-

Column	Type	Null	Default
patient_no *(Primary)*	int(11)	No	
first_name	varchar(20)	No	
last_name	varchar(20)	Yes	*NULL*
Gender	char(1)	No	
Address	varchar(30)	Yes	*NULL*
date_of_birth	Date	No	
problem_desc	Tinytext	Yes	*NULL*
contact_no	char(10)	Yes	*NULL*
in-out	char(4)	No	
Password	varchar(10)	No	
Ssn	char(10)	Yes	*NULL*

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	patient_no	7	A	No	
Ssn	BTREE	No	No	Ssn	2	A	Yes	

4.2.9 Pharmacy-

Column	Type	Null	Default
drug_id *(Primary)*	int(11)	No	
drug_name	int(11)	No	
Quantity	int(11)	No	
Tags	int(11)	Yes	*NULL*

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	drug_id	0	A	No	

4.2.10 room_alloted-

Column	Type	Null	Default
room_no	int(11)	No	
bed_no	int(11)	No	
patient_no	int(11)	No	
checkin_on	Date	No	
checkout_on	Date	Yes	*NULL*

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
patient_no_fk1	BTREE	No	No	patient_no	0	A	No	

4.2.11 staff-

Column	Type	Null	Default
staff_no *(Primary)*	int(11)	No	
first_name	varchar(20)	No	
last_name	varchar(20)	No	
Address	varchar(30)	No	
phone_no	char(10)	No	
dept_no	int(2)	No	
Designation	varchar(15)	No	
Email	varchar(20)	No	
Password	varchar(10)	No	
staff_type	varchar(20)	No	Undefined

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	staff_no	1	A	No	

4.2.12 symptoms-

Column	Type	Null	Default
Symptom	varchar(40)	No	
id *(Primary)*	int(11)	No	

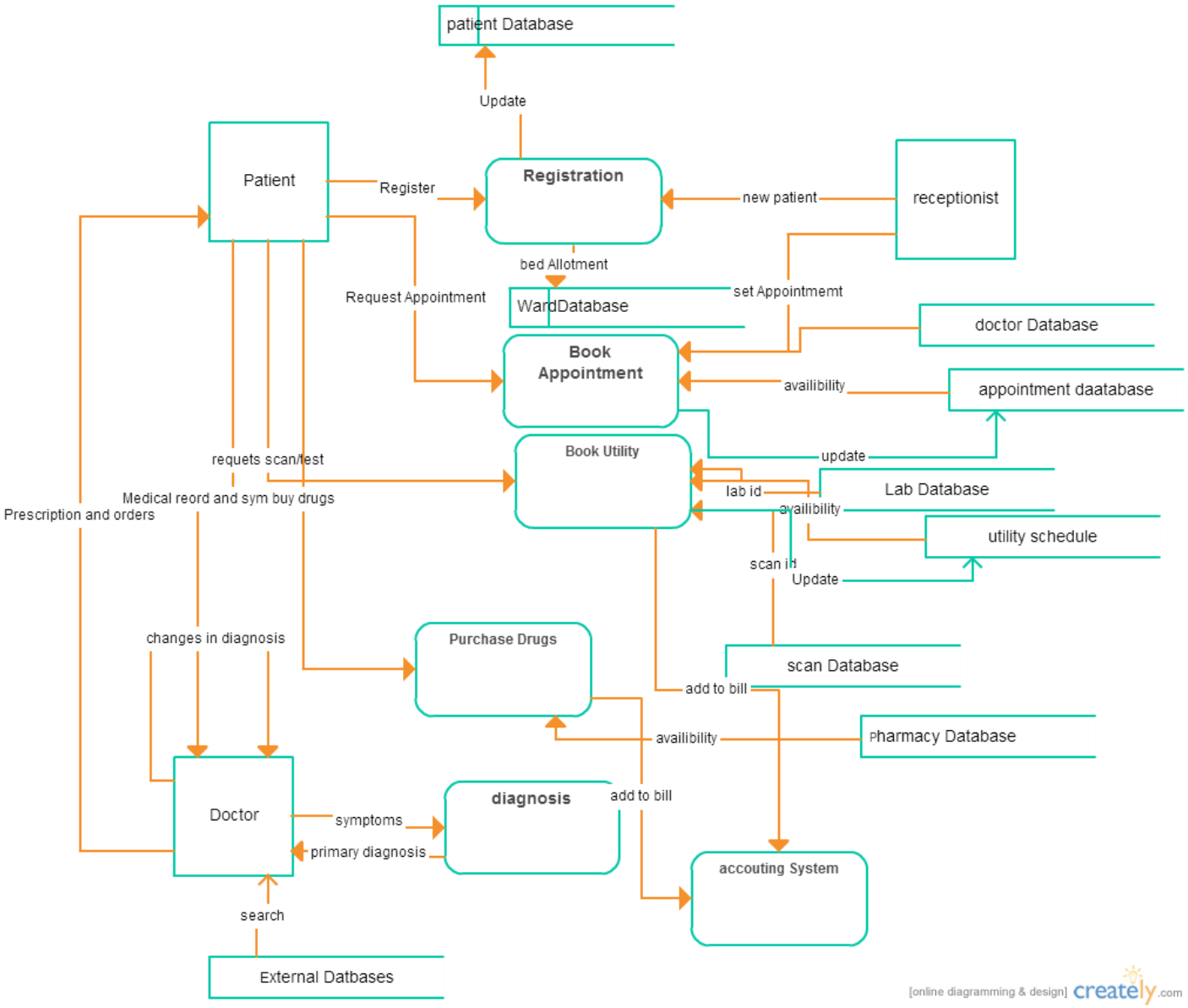
Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	id	42	A	No	id_pk1
Id	BTREE	No	No	id	42	A	No	

5 Component Design

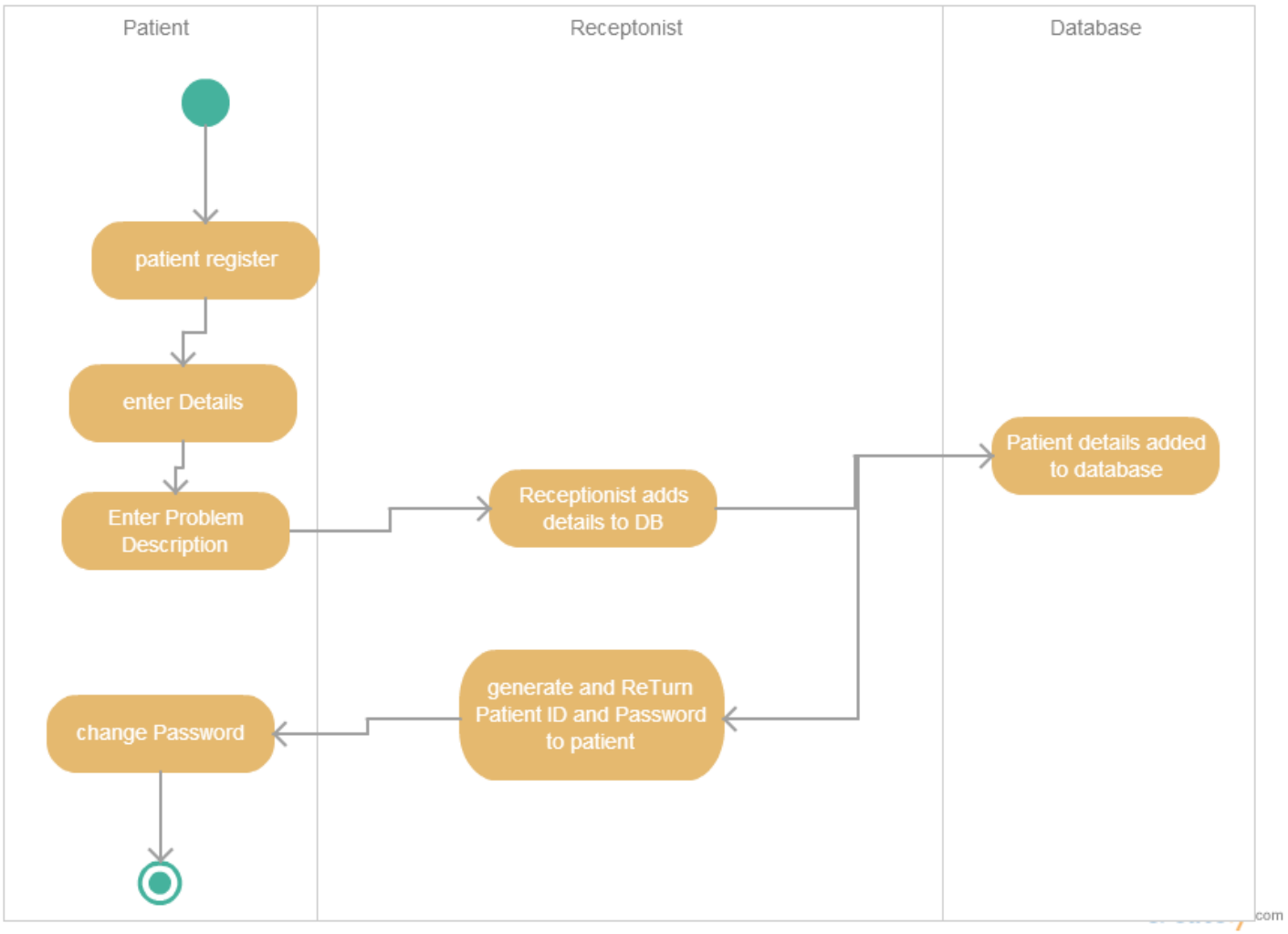
This section describes how components interact with one another to achieve the desired functionalities. It depicts the flow of information through various components in response to the prcesses that are being carried out.

Dataflow Diagram

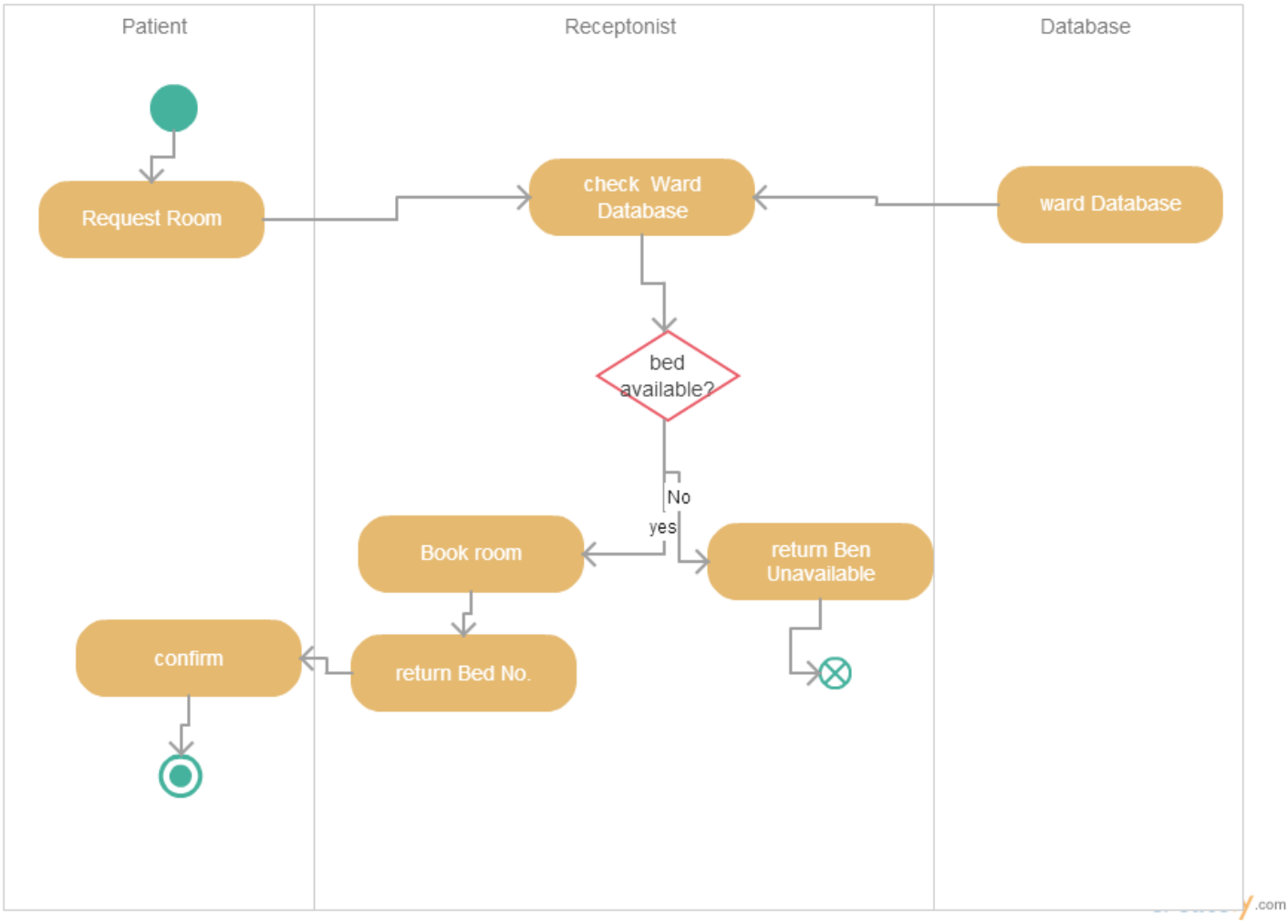


Activity Diagrams

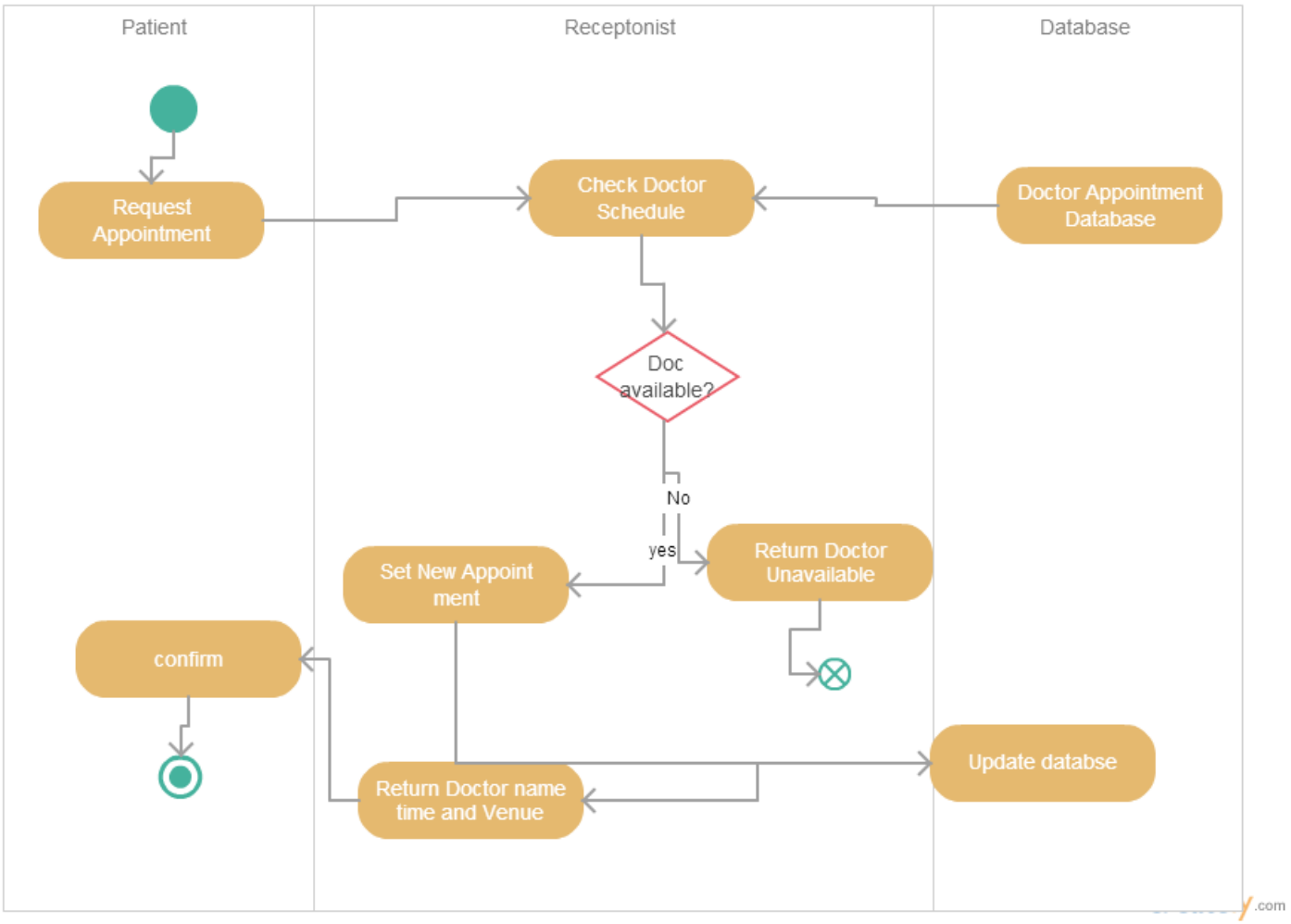
New Patient Registration



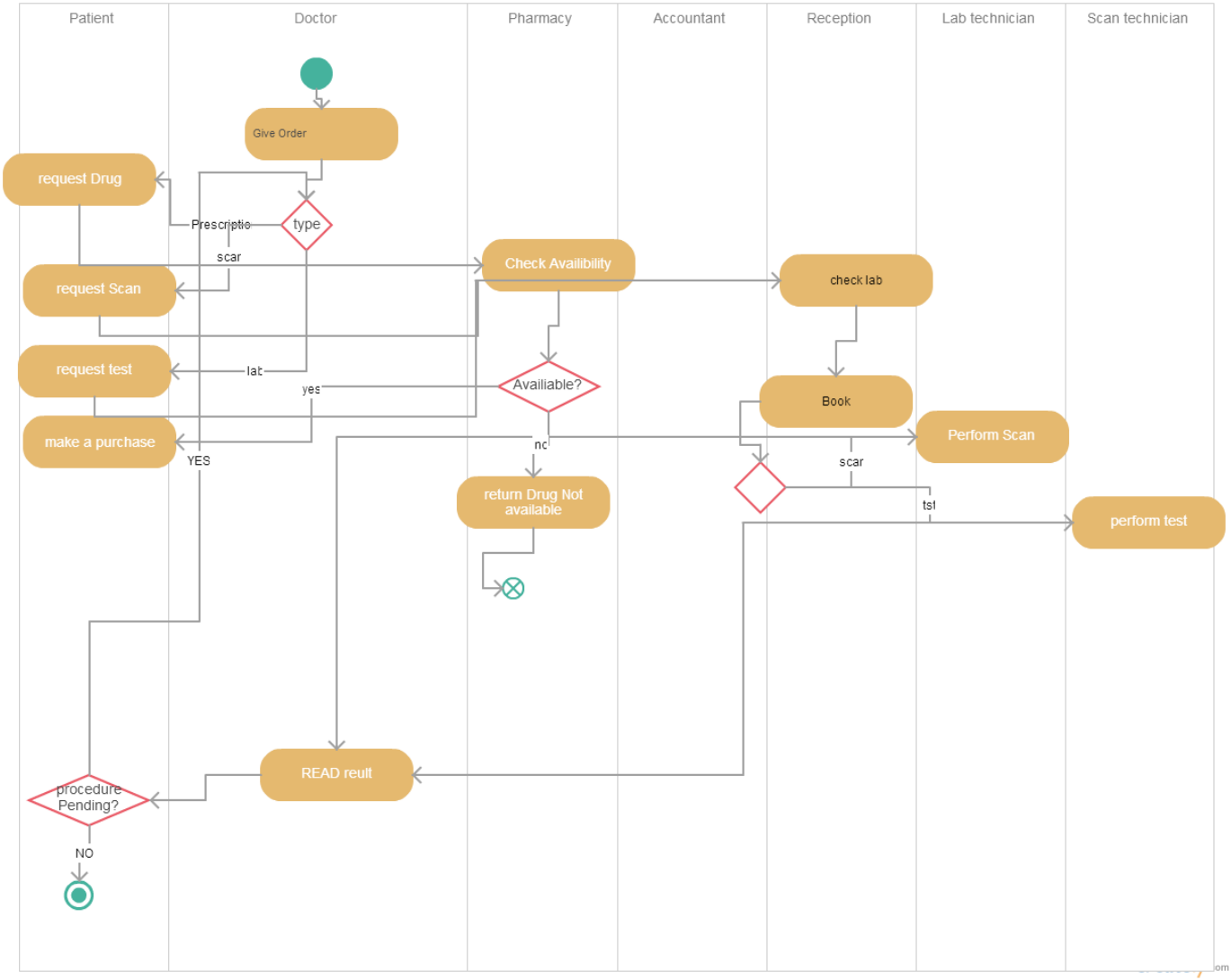
Bed Allotment



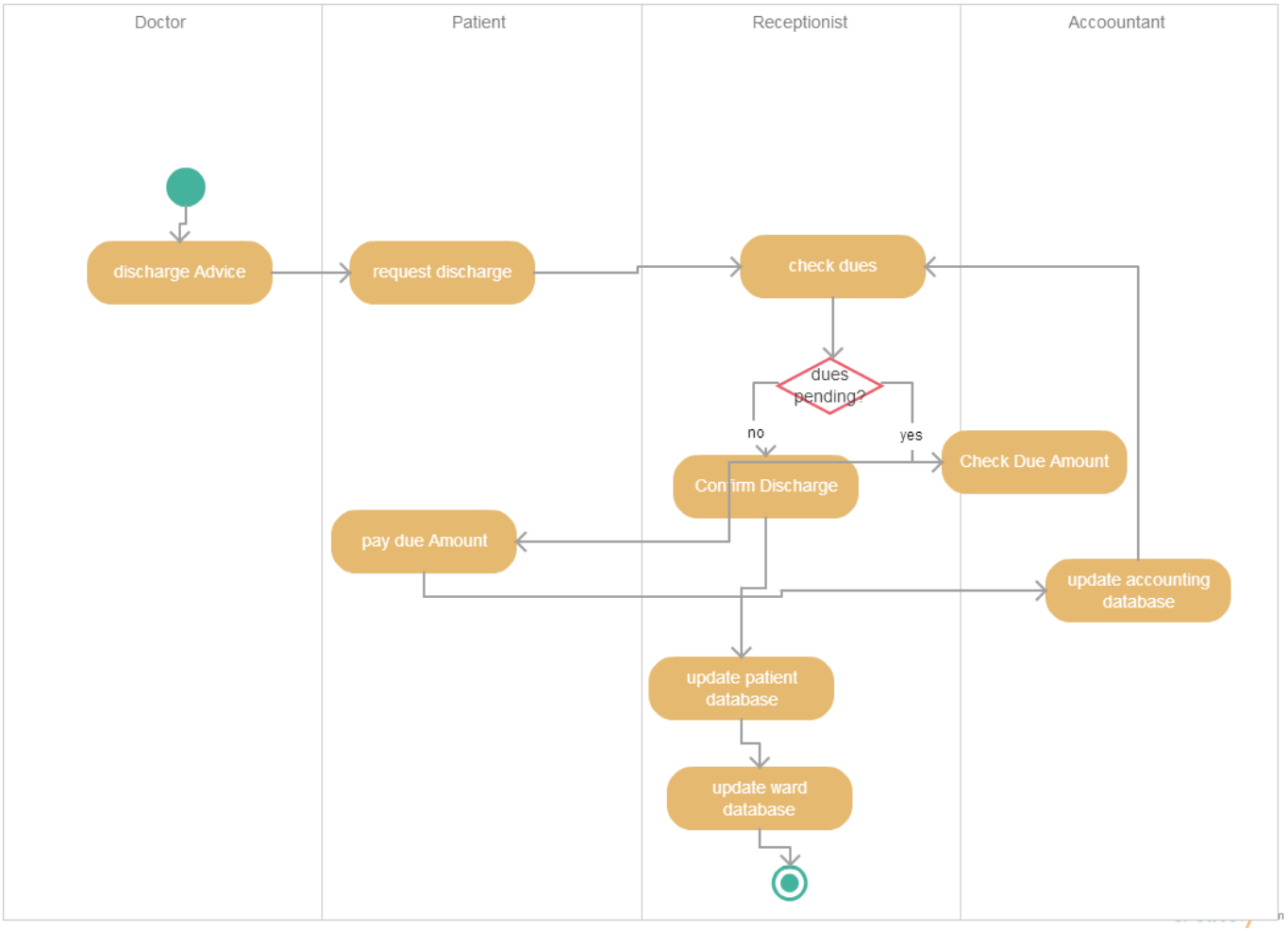
Appointment



Prescription And Drugs


Patient
Doctor
Pharmacy
Accountant
Reception
Lab technician
Scan technician
Give Order
request Drug
Prescriptio
type
scar
request Scan
Check Availibility
check lab
request test
lat
yes
Availiable?
Book
make a purchase
YES
nc
Perform Scan
scar
return Drug Not available
tst
perform test
READ reult
procedure Pending?
NO

Discharge



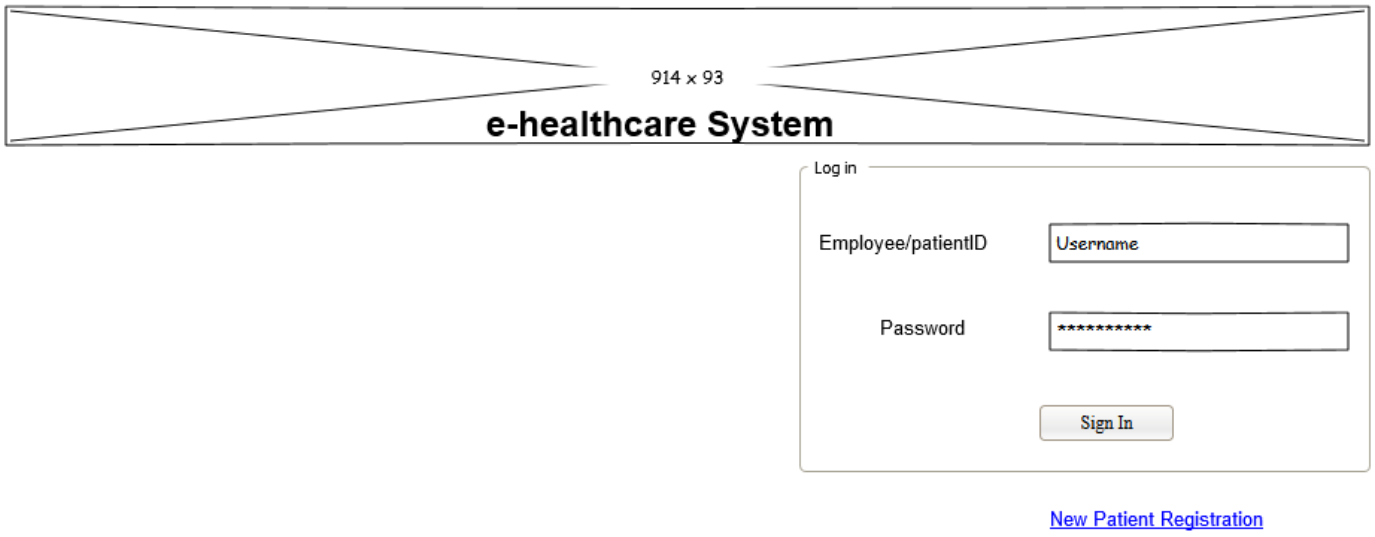
6 Human Interface Design

6.1 Overview

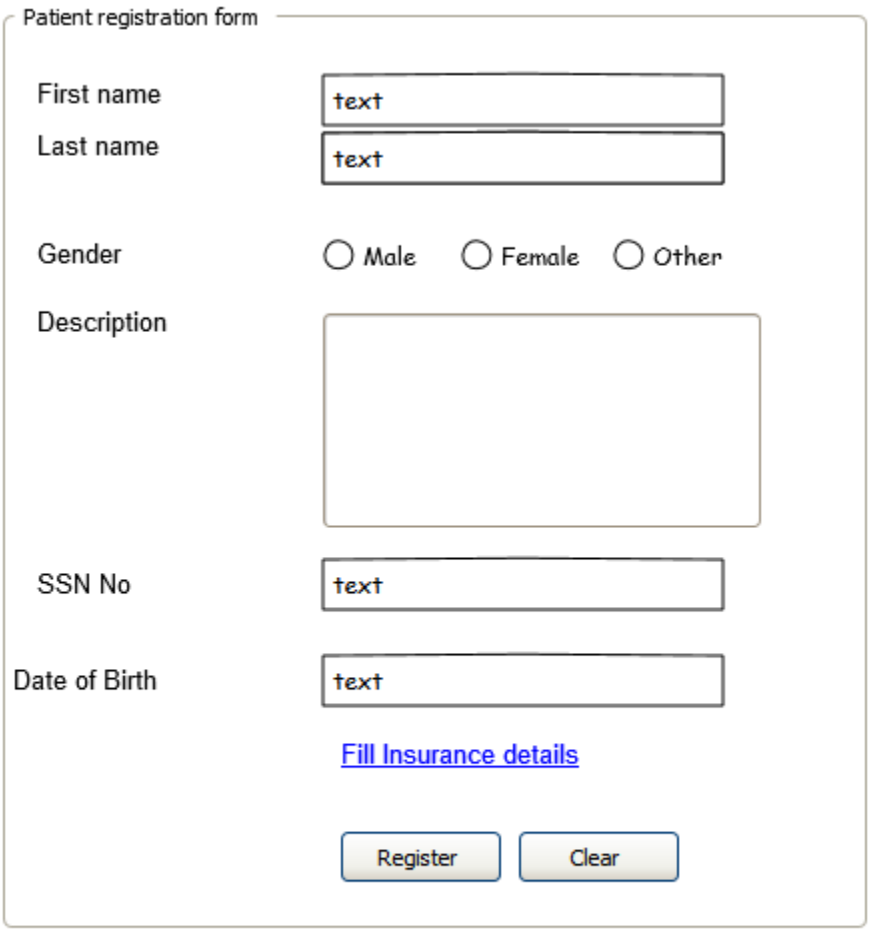
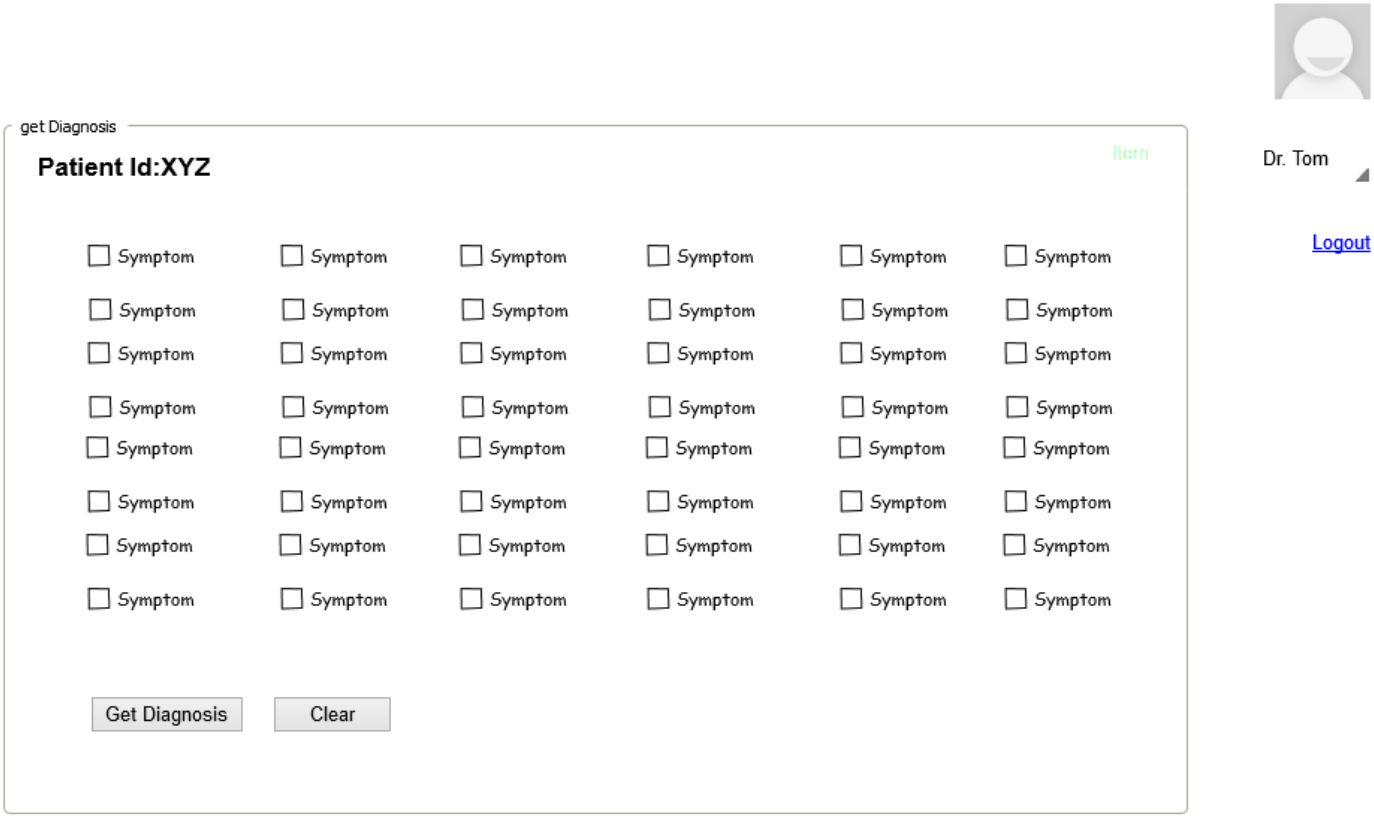
This section showcases the look and feel of the system and how user can interact with it
The user interface would be a webpage and user can interact with the system using mouse and keyboard for clicking on buttons and links and typing data. The user must have the basic knowledge of how to travel through web pages. The interface is entirely in English. The following section tries to build an idea about how the system will look when completed.

6.2 Screen Images

6.2.1 Welcome Page



6.2.2 New Patient Registration



6.2.3 Doctor's Page