SYSTEM DESIGN

6.1. INTRODUCTION

Software design sits at the technical kernel of the software engineering process and is applied regardless of the development paradigm and area of application. Design is the first step in the development phase for any engineered product or system. The designer's goal is to produce a model or representation of an entity that will later be built. Beginning, once system requirement have been specified and analyzed, system design is the first of the three technical activities - design, code and test that is required to build and verify software.

The importance can be stated with a single word "Quality". Design is the place where quality is fostered in software development. Design provides us with representations of software that can assess for quality. Design is the only way that we can accurately translate a customer's view into a finished software product or system. Software design serves as a foundation for all the software engineering steps that follow. Without a strong design we risk building an unstable system – one that will be difficult to test, one whose quality cannot be assessed until the last stage.

During design, progressive refinement of data structure, program structure, and procedural details are developed reviewed and documented. System design can be viewed from either technical or project management perspective. From the technical point of view, design is comprised of four activities – architectural design, data structure design, interface design and procedural design.

6.2. NORMALIZATION

It is a process of converting a relation to a standard form. The process is used to handle the problems that can arise due to data redundancy i.e. repetition of data in the database, maintain data integrity as well as handling problems that can arise due to insertion, updation, deletion anomalies.

Decomposing is the process of splitting relations into multiple relations to eliminate anomalies and maintain anomalies and maintain data integrity. To do this we use normal forms or rules for structuring relation.

Insertion anomaly: Inability to add data to the database due to absence of other data.

Deletion anomaly: Unintended loss of data due to deletion of other data.

Update anomaly: Data inconsistency resulting from data redundancy and partial update

Normal Forms: These are the rules for structuring relations that eliminate anomalies.

FIRST NORMAL FORM:

A relation is said to be in first normal form if the values in the relation are atomic for every attribute in the relation. By this we mean simply that no attribute value can be a set of values or, as it is sometimes expressed, a repeating group.

SECOND NORMAL FORM:

A relation is said to be in second Normal form is it is in first normal form and it should satisfy any one of the following rules.

1) Primary key is a not a composite primary key
2) No non key attributes are present

3) Every non key attribute is fully functionally dependent on full set of primary key.

THIRD NORMAL FORM:

A relation is said to be in third normal form if their exits no transitive dependencies.

Transitive Dependency: If two non key attributes depend on each other as well as on the primary key then they are said to be transitively dependent.

The above normalization principles were applied to decompose the data in multiple tables thereby making the data to be maintained in a consistent state.

6.3. DATA DICTIONARY

Database Tables (Data Dictionary): After careful analysis the system has identified to be presented with the following database tables:

NUMBER OF DATABASE TABLES

The project has been identified to contain 22 database tables, which are as follows

TNAME	TABTYPE
Administrator	TABLE
Deleteuser	TABLE
Doctor	TABLE
Employee	TABLE
GeneralBeds	TABLE
GeneralWard	TABLE
ICUBeds	TABLE
ICUWards	TABLE
Lab_Charges	TABLE
OrgCodeAddrs	TABLE
Patient_Admit	TABLE
Patient_Bill	TABLE
Patient_DischargeDetails	TABLE
Patient_LabDetails	TABLE
Patient_Registration	TABLE
Patient_SurgeryDetails	TABLE
Request	TABLE
Schedule	TABLE
Surgery_Charges	TABLE
TestReport	TABLE

Treatment	TABLE
WardBed_Charges	TABLE

1) Table Name: ADMINISTRATOR

NAME	DATATYPE	CONSTRAINT
Fname	TEXT	
Lname	TEXT	
DOB	DATE	
DESIGNATION	TEXT	
ADDR1	TEXT	
ADDR2	TEXT	
DISTRICT	TEXT	
STATE	TEXT	
COUNTRY	TEXT	
MOBILE	TEXT	
EMAILID	TEXT	
USERNAME	TEXT	NOTNULL
PASSWORD	TEXT	

2) Table Name: DELETEUSER

NAME	DATATYPE	CONSTRAINT
USERNAME	TEXT	
PASSWORD	TEXT	

DOB	DATE	
EMPNO	TEXT	

3) Table Name: DOCTOR

NAME	DATATYPE	CONSTRAINT
DOCID	NUMBER	NOTNULL
Fname	TEXT	
LNAME	TEXT	
JOINDATE	DATE	
EMAIL	TEXT	
PHONE	TEXT	
QUALIFICATION	TEXT	
DESIGNATION	TEXT	
SPECIALISATION	TEXT	
WORKINGHOURS	TEXT	
DSTATUS	TEXT	
USERNAME	TEXT	
PASSWORD	TEXT	

4) Table Name: EMPLOYEE

NAME	DATATYPE	CONSTRAINT
EMPNO	NUBER(5)	NOTNULL

EFname	TEXT	
ELNAME	TEXT	
DOB	DATE	
DESIGNATION	TEXT	
ADDR1	TEXT	
ADDR2	TEXT	
DISTRICT	TEXT	
STATE	TEXT	
COUNTRY	TEXT	
MOBILE	TEXT	
EMPUSERNAME	TEXT	
PASSWORD	TEXT	
USERTYPE	TEXT	

5) Table Name: GENERALBEDS

NAME	DATATYPE	CONSTRAINT
GBEDNO	TEXT	NOT NULL
WARDNO	TEXT	
FILLED	NUBER(5)	

6) Table Name: GENERALWARD

NAME	DATATYPE	CONSTRAINT

WARDNO	TEXT	NOT NULL

7) Table Name: ICUBEDS

NAME	DATATYPE	CONSTRAINT
IBEDNO	TEXT	NOT NULL
WARDNO	TEXT	
FILLED	NUMBER	

8) Table Name: ICUWARD

NAME	DATATYPE	CONSTRAINT
WARDNO	TEXT	NOT NULL

9) Table Name: LABCHARGES

NAME	DATATYPE	CONSTRAINT
TNAME	TEXT	NOT NULL
AMOUNT	NUMBER	
DATE	DATE	

10) Table Name:ORGCODEADDRS

NAME	DATATYPE	CONSTRAINT
CODE	TEXT	NOT NULL
NAME	TEXT	NOTNULL
ADDR1	TEXT	NOTNULL
ADDR2	TEXT	NOTNULL

11) Table Name: PATIENT_ADMIT

NAME	DATATYPE	CONSTRAINT
REGNO	NUMBER	
DIESEASENAME	TEXT	
WARDTYPE	TEXT	
WARDNO	TEXT	
IBEDNO	TEXT	
GBEDNO	TEXT	
PAYINGAMOUNT	NUMBER	
DOA	DATE	
TOA	DATE	

12) Table Name: PATIENT_BILL

NAME	DATATYPE	CONSTRAINT
REGNO	NUMBER	
BILLTYPE	TEXT	
ACTUALAMOUNT	NUMBER	

PAIDAMOUNT	NUMBER	
DOP	DATE	
TOP	DATE	

13) Table Name: PATIENT_DISCHARGEDETAILS

NAME	DATATYPE	CONSTRAINT
REGNO	NUMBER	
DATE	DATE	
TIME	DATE	

14) Table Name: PATIENT_LABDETAILS

NAME	DATATYPE	CONSTRAINT
REGNO	NUMBER	
TNAME	TEXT	
AMOUNT	NUMBER	
DOR	DATE	
TOR	DATE	

15) Table Name: PATIENT_REGISTRATION

NAME	DATATYPE	CONSTRAINT
REGNO	NUBER(5)	NOTNULL
CASENO	TEXT	
PFNAME	TEXT	
PLNAME	TEXT	

GUADIAN	TEXT	
GENDER	TEXT	
AGE	TEXT	
REGISTRATIONFEE	NUMBER	
BLOODGROUP	TEXT	
DOR	DATE	
TOR	DATE	

16) Table Name: PATIENT_SURDERYDETAILS

NAME	DATATYPE	CONSTRAINT
REGNO	NUMBER	
SURGERYNAME	TEXT	
AMOUNT	NUMBER	
DOS	DATE	
TOS	DATE	

17) Table Name: REQUEST

NAME	DATATYPE	CONSTRAINT
Firstname	TEXT	
LastName	TEXT	
DOB	DATE	
GENDER	TEXT	
AGE	DATE	
FULLNAME	TEXT	

ADDRS	TEXT	
CITY	TEXT	
STATE	TEXT	
COUNTRY	TEXT	
TELEPHONE	TEXT	
FAX	TEXT	
EMAILID	TEXT	
CONDITION	TEXT	
REPORTS	TEXT	
DFULLNAME	TEXT	
DEMAILID	TEXT	
SERVICES	TEXT	

18) Table Name: SCHEDULE

NAME	DATATYPE	CONSTRAINT
SCHID	NUMBER	
DOCID	NUMBER	
DATE	DATE	
TIME	DATE	
SSTATUS	TEXT	

19) Table Name: SURGERY_CHARGES

NAME	DATATYPE	CONSTRAINT
NAME	TEXT	

AMOUNT	TEXT	

20) Table Name: TESTREPORT

NAME	DATATYPE	CONSTRAINT
TRID	NUMBER	
PID	NUMBER	
DOCID	NUMBER	
BLOODGROUP	TEXT	
ECGTEST	TEXT	
SCANNING	TEXT	
XRAYTEST	TEXT	
STATUS	TEXT	

21) Table Name: TREATMENT

NAME	DATATYPE	CONSTRAINT
TRID	NUMBER	
PID	NUMBER	
DOCID	NUMBER	
DIESEASE	TEXT	
MEDCINE	TEXT	
FEEDBACK	TEXT	
STATUS	TEXT	

22) Table Name: WARDBED_CHARGES

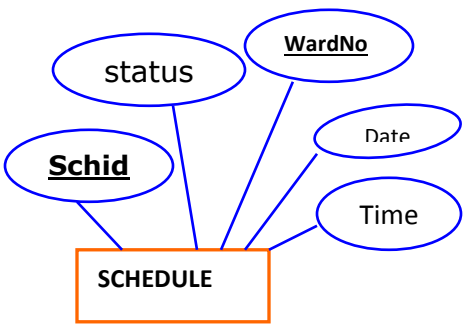
NAME	DATATYPE	CONSTRAINT
WARD	TEXT	
WARDTYPE	TEXT	
BEDCHARGES	NUMBER	

6.4. E – R DIAGRAMS

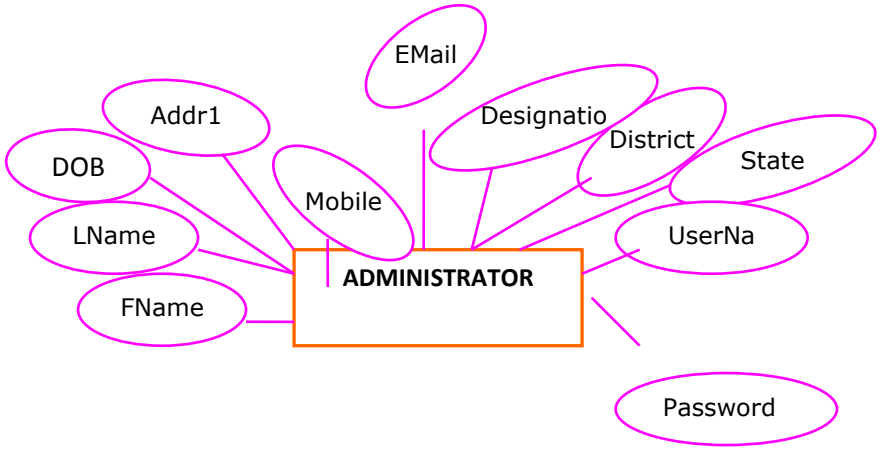
- The relation upon the system is structure through a conceptual ER-Diagram, which not only specifics the existential entities but also the standard relations through which the system exists and the cardinalities that are necessary for the system state to continue.
- The Entity Relationship Diagram (ERD) depicts the relationship between the data objects. The ERD is the notation that is used to conduct the date modeling activity the attributes of each data object noted is the ERD can be described resign a data object descriptions.
- The set of primary components that are identified by the ERD are
    - Data object
    - Relationships
    - Attributes
    - Various types of indicators.

The primary purpose of the ERD is to represent data objects and their relationships.

SCHEDULE:-



ADMINISTRATOR:-



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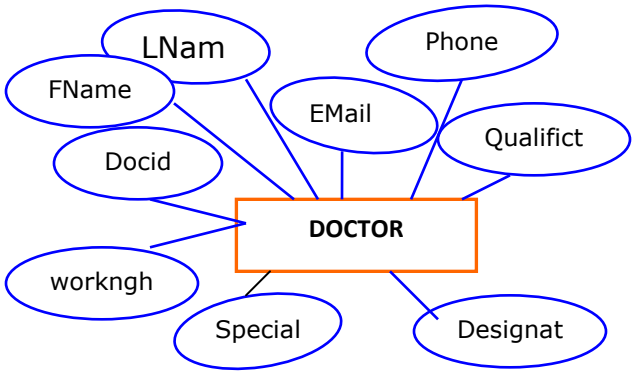
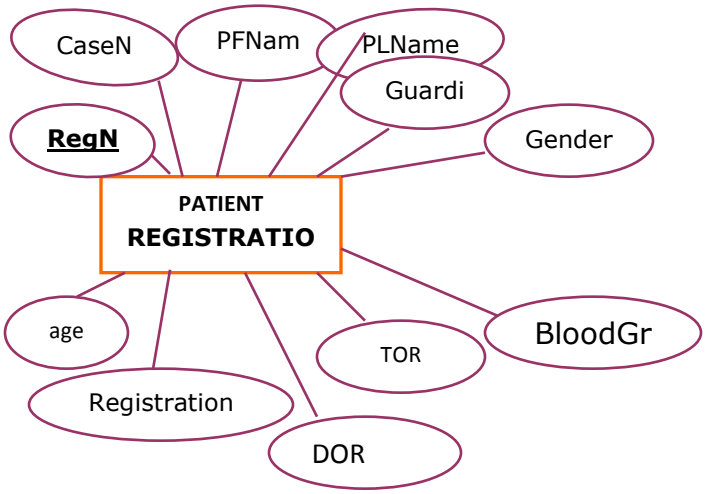
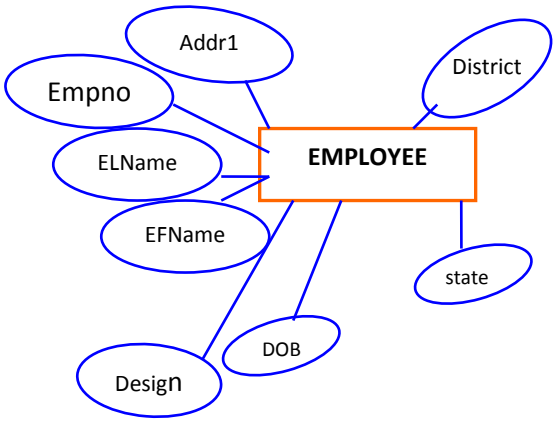


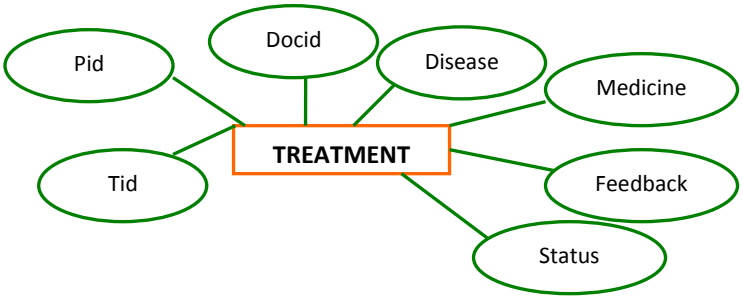
PATIENT REGISTRATION:-



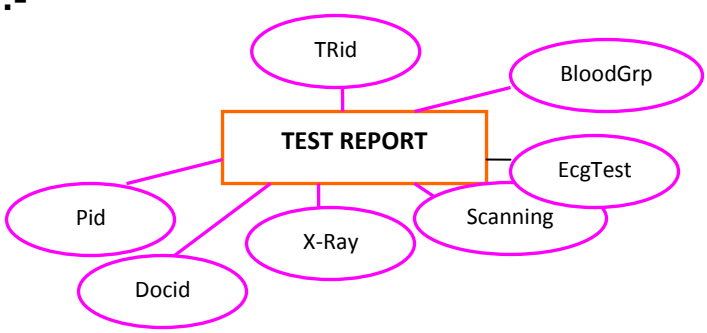
EMPLOYEE:-



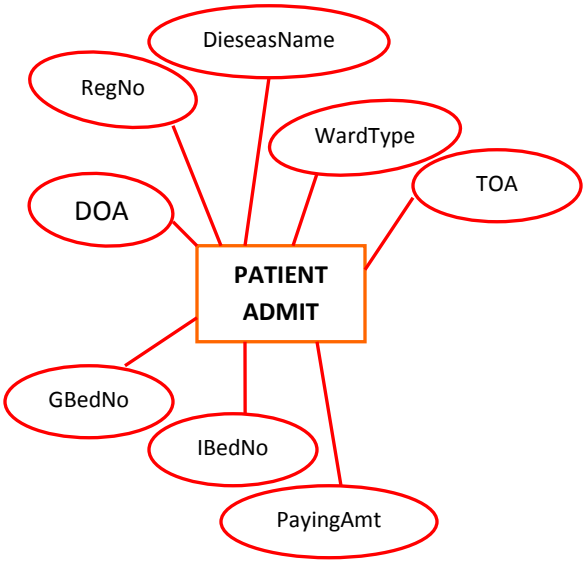
TREATMENT:-



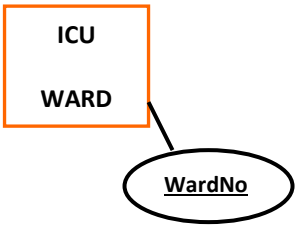
TEST REPORT:-



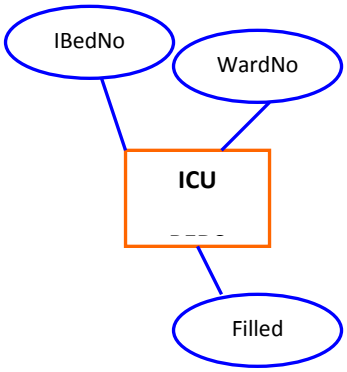
PATIENT ADMITS:-



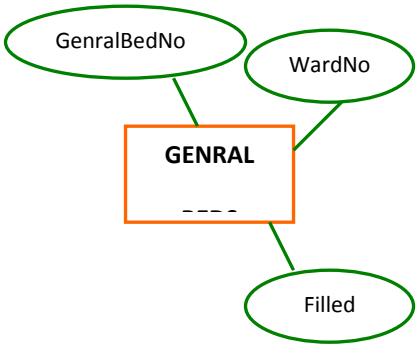
ICU WARD:-



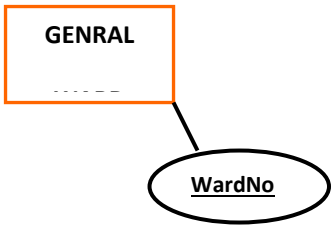
ICU BEDS:-



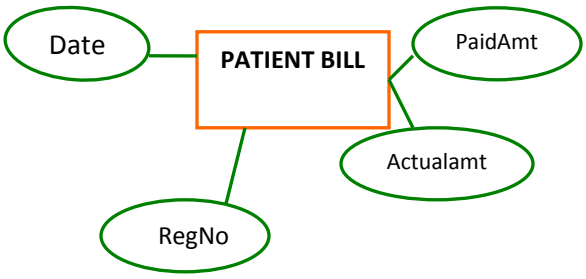
GENERAL BEDS:-



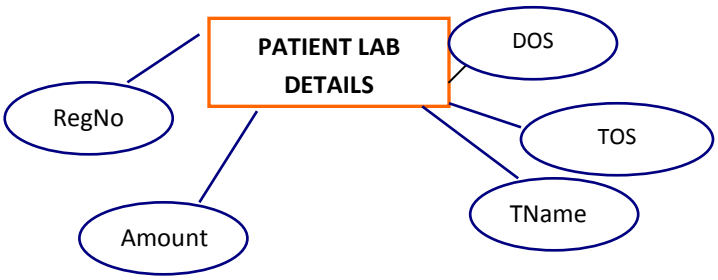
GENRAL WARD:-



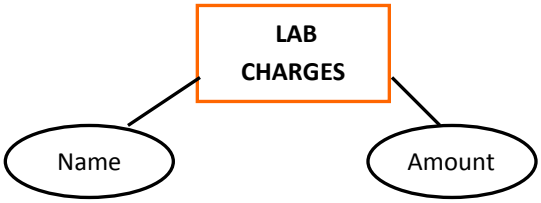
PATIENT BILL:-



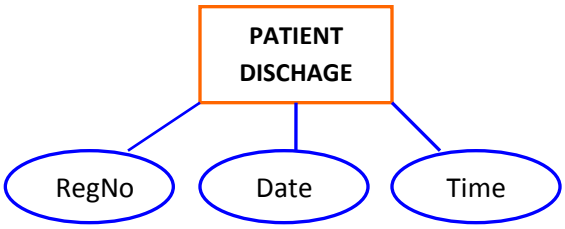
PATIENT LAB DETAILS:-



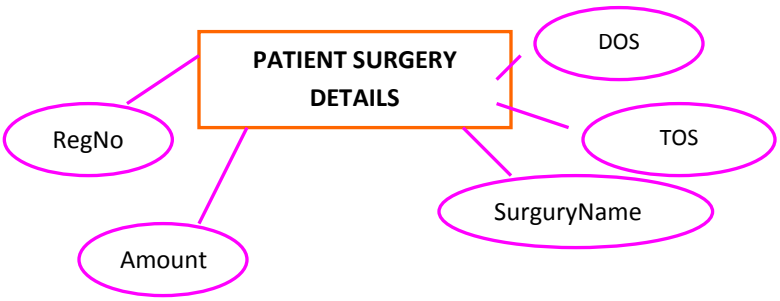
LAB CHARGES:-



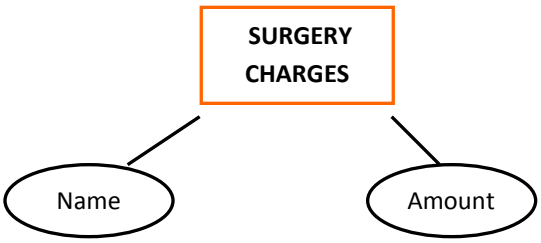
PATIENT DISCHARGE:-



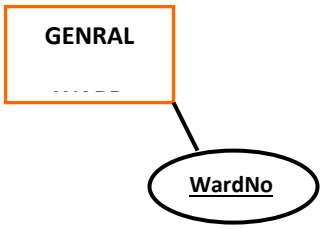
PATIENT SURGERY DETAILS:-



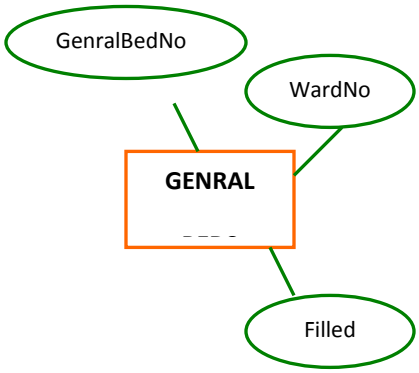
SURGERY CHARGES:-



GENRAL WARD:-



GENRAL BEDS:-



6.5. DATA FLOW DIAGRAMS

A data flow diagram is graphical tool used to describe and analyze movement of data through a system. These are the central tool and the basis from which the other components are developed. The transformation of data from input to output, through processed, may be described logically and independently of physical components associated with the system. These are known as the logical data flow diagrams. The physical data flow diagrams show the actual implements and movement of data between people, departments and workstations. A full description of a system actually consists of a set of data flow diagrams. Using two familiar notations Yourdon, Gane and Sarson notation develops the data flow diagrams. Each component in a DFD is labeled with a descriptive name. Process is further identified with a number that will be used for identification purpose. The development of DFD'S is done in several levels. Each process in lower level diagrams can be broken down into a more detailed DFD in the next level. The lop-level diagram is often called context diagram. It consist a single process bit, which plays vital role in studying the current system. The process in the context level diagram is exploded into other process at the first level DFD.

The idea behind the explosion of a process into more process is that understanding at one level of detail is exploded into greater detail at the next level. This is done until further explosion is necessary and an adequate amount of detail is described for analyst to understand the process.

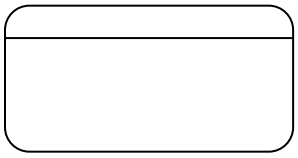
Larry Constantine first developed the DFD as a way of expressing system requirements in a graphical from, this lead to the modular design.

A DFD is also known as a "bubble Chart" has the purpose of clarifying system requirements and identifying major transformations that will become programs in system design. So it is the starting point of the design to the lowest level of detail. A DFD consists of a series of bubbles joined by data flows in the system.

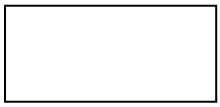
DFD SYMBOLS:

In the DFD, there are four symbols

1. A square defines a source(originator) or destination of system data
2. An arrow identifies data flow. It is the pipeline through which the information flows
3. A circle or a bubble represents a process that transforms incoming data flow into outgoing data flows.
4. An open rectangle is a data store, data at rest or a temporary repository of data



Process that transforms data flow



Source or Destination of data

Data flow

Data Store

CONSTRUCTING A DFD:

Several rules of thumb are used in drawing DFD'S:

1. Process should be named and numbered for an easy reference. Each name should be representative of the process.
2. The direction of flow is from top to bottom and from left to right. Data traditionally flow from source to the destination although they may flow back to the source. One way to indicate this is to draw long flow line back to a source.

An alternative way is to repeat the source symbol as a destination. Since it is used more than once in the DFD it is marked with a short diagonal.

3. When a process is exploded into lower level details, they are numbered.
4. The names of data stores and destinations are written in capital letters. Process and dataflow names have the first letter of each work capitalized

A DFD typically shows the minimum contents of data store. Each data store should contain all the data elements that flow in and out.

Questionnaires should contain all the data elements that flow in and out. Missing interfaces redundancies and like is then accounted for often through interviews.

SAILENT FEATURES OF DFD'S

1. The DFD shows flow of data, not of control loops and decision are controlled considerations do not appear on a DFD.
2. The DFD does not indicate the time factor involved in any process whether the dataflow take place daily, weekly, monthly or yearly.
3. The sequence of events is not brought out on the DFD.

TYPES OF DATA FLOW DIAGRAMS

1. Current Physical
2. Current Logical
3. New Logical
4. New Physical

CURRENT PHYSICAL:

In Current Physical DFD process label include the name of people or their positions or the names of computer systems that might provide some of the overall system-processing label includes an identification of the technology used to process the data. Similarly data flows and data stores are often labels with the names of the actual physical media on which data are stored such as file folders, computer files, business forms or computer tapes.

CURRENT LOGICAL:

The physical aspects at the system are removed as much as possible so that the current system is reduced to its essence to the data and the processors that transform them regardless of actual physical form.

NEW LOGICAL:

This is exactly like a current logical model if the user were completely happy with the user were completely happy with the functionality of the current system but had problems with how it was implemented typically through the new logical model will differ from current logical model while having additional functions, absolute function removal and inefficient flows recognized.

NEW PHYSICAL:

The new physical represents only the physical implementation of the new system.

RULES GOVERNING THE DFD'S

PROCESS

1) No process can have only outputs.
2) No process can have only inputs. If an object has only inputs than it must be a sink.
3) A process has a verb phrase label.

DATA STORE

1) Data cannot move directly from one data store to another data store, a process must move data.
2) Data cannot move directly from an outside source to a data store, a process, which receives, must move data from the source and place the data into data store
3) A data store has a noun phrase label.

SOURCE OR SINK

The origin and /or destination of data

1) Data cannot move direly from a source to sink it must be moved by a process
2) A source and /or sink has a noun phrase land

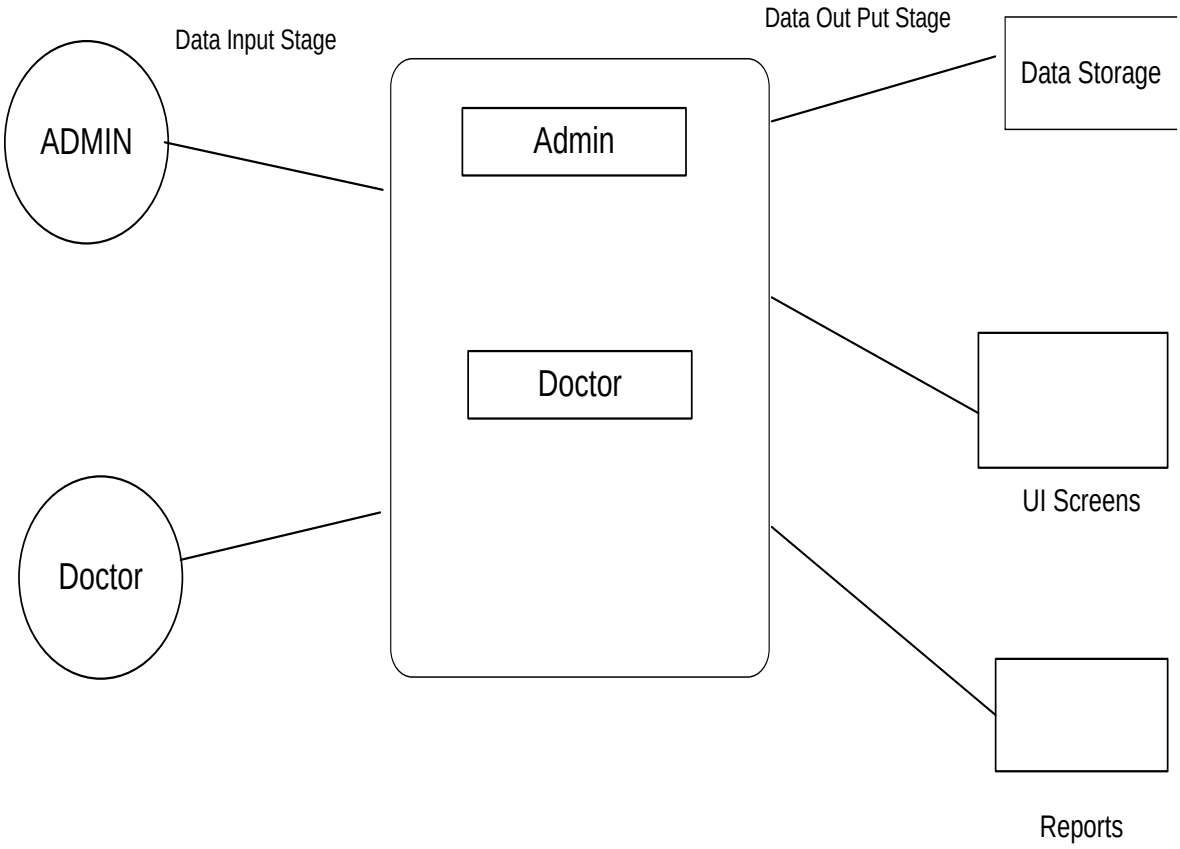
DATA FLOW

1) A Data Flow has only one direction of flow between symbols. It may flow in both directions between a process and a data store to show a read before an update. The later is usually indicated however by two separate arrows since these happen at different type.
2) A join in DFD means that exactly the same data comes from any of two or more different processes data store or sink to a common location.
3) A data flow cannot go directly back to the same process it leads. There must be at least one other process that handles the data flow produce some other data flow returns the original data into the beginning process.
4) A Data flow to a data store means update (delete or change).
5) A data Flow from a data store means retrieve or use.

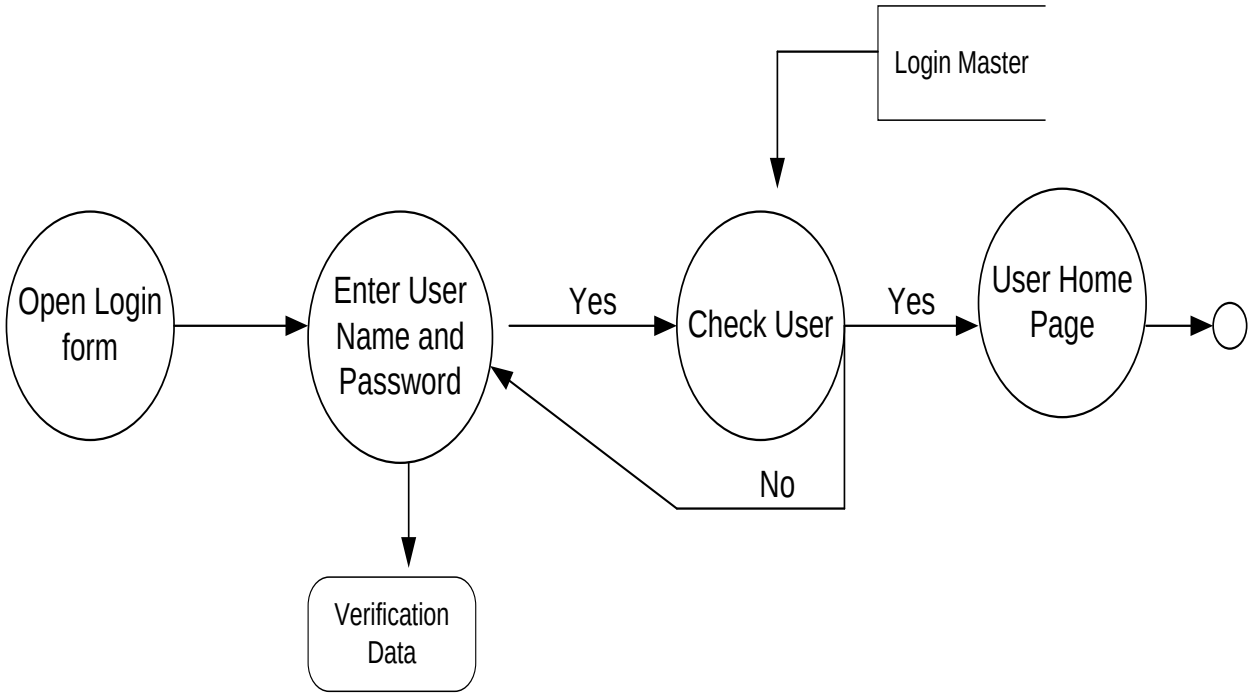
A data flow has a noun phrase label more than one data flow noun phrase can appear on a single arrow as long as all of the flows on the same arrow move together as one package.

Health Care DFD's

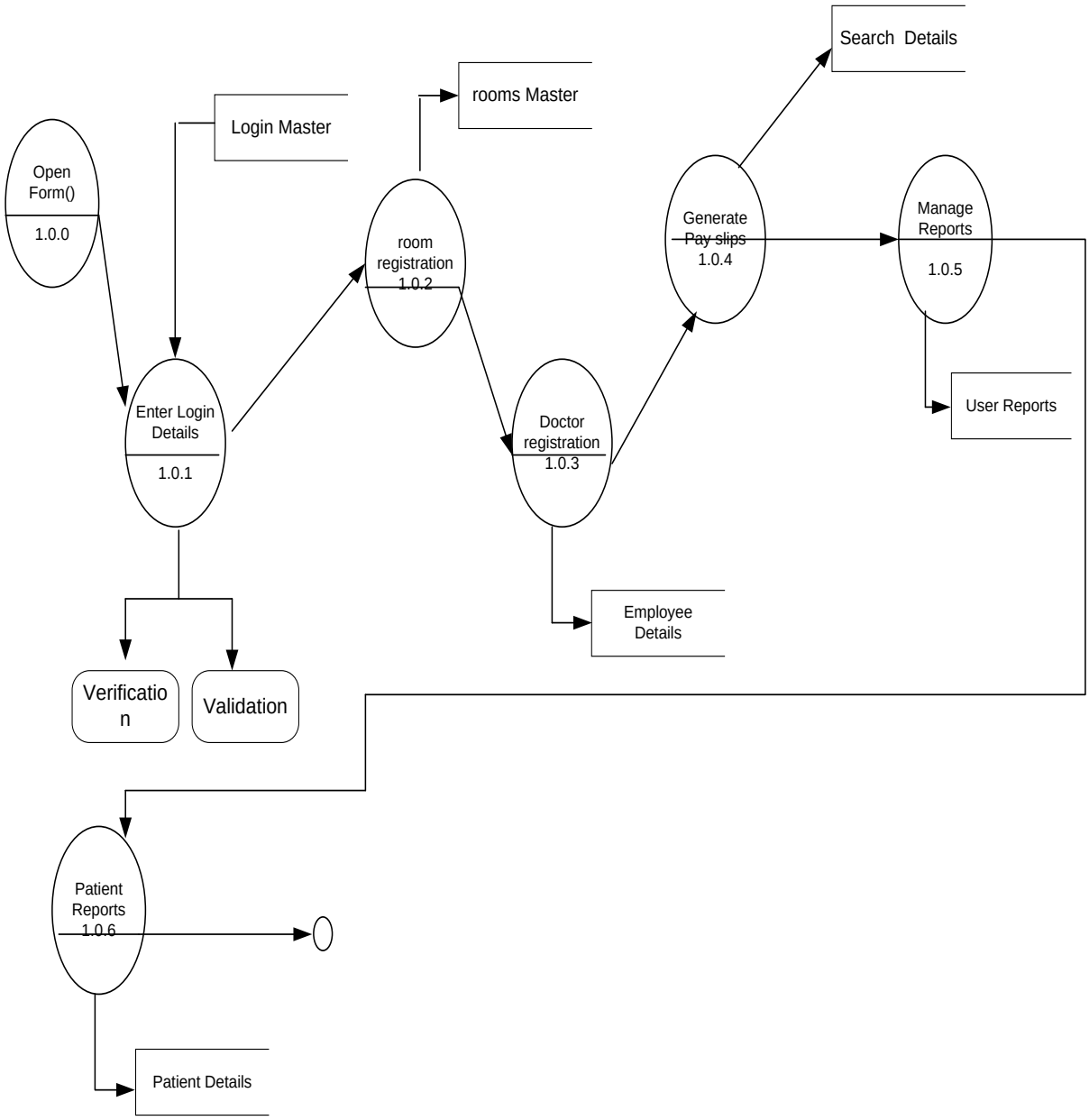
Context Level DFD



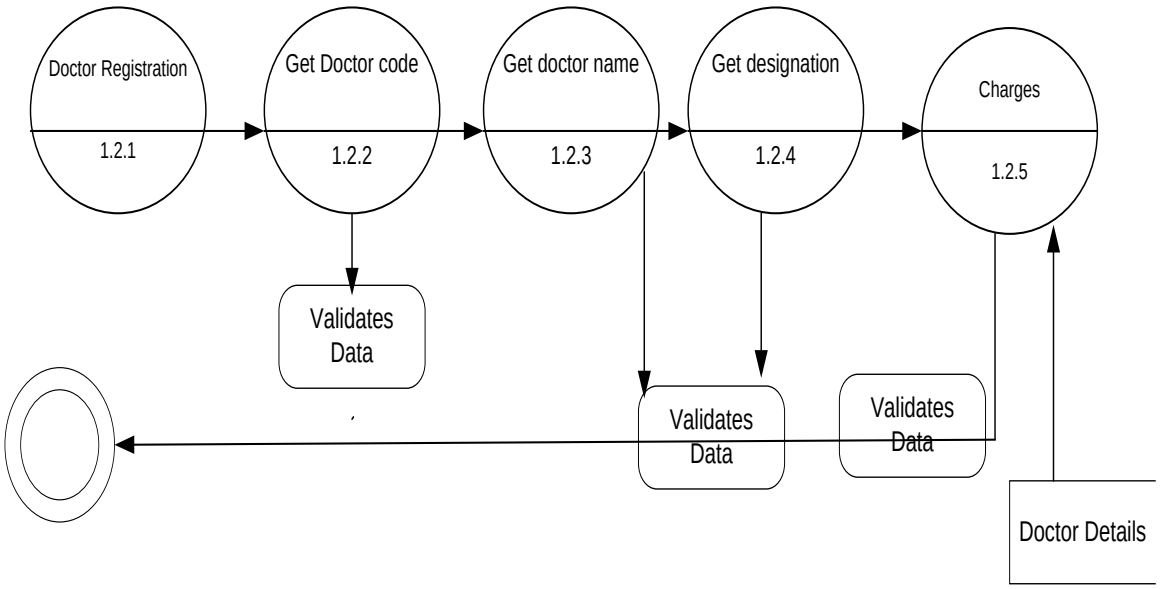
Login DFD


Login Master
Open Login form
Enter User Name and Password
Yes
Check User
Yes
User Home Page
No
Verification Data

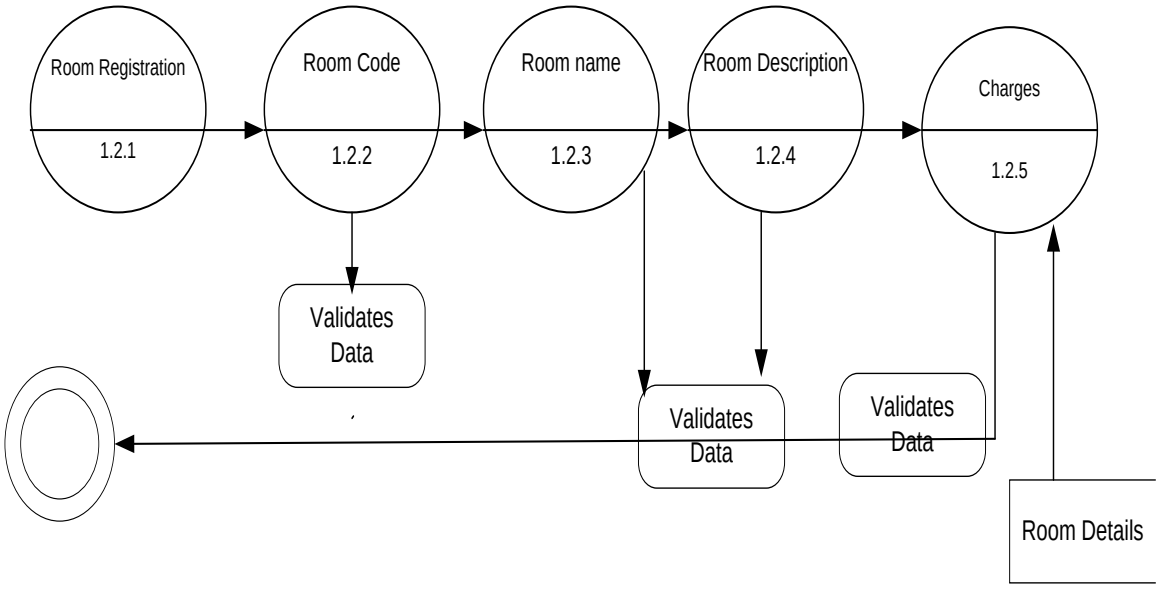
Admin Activities (1st Level)



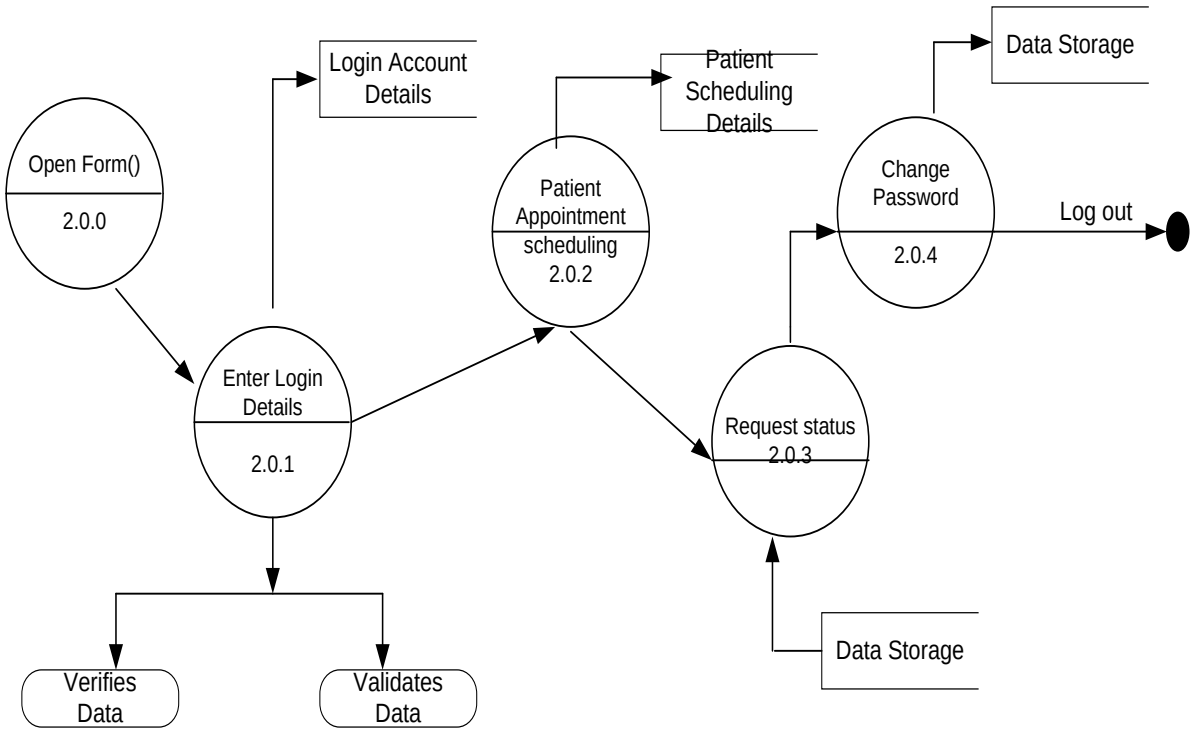
Admin Register Doctors



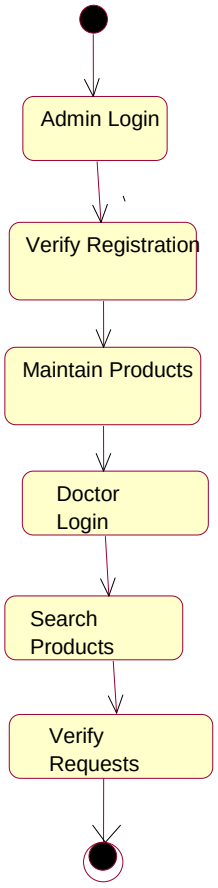
Admin Register Room



User (Employee) Activities (2nd Level):



6.6. ACTIVITY DIAGRAMS



6.7. USE CASE DIAGRAMS

Figure: Admin Use Case Diagram

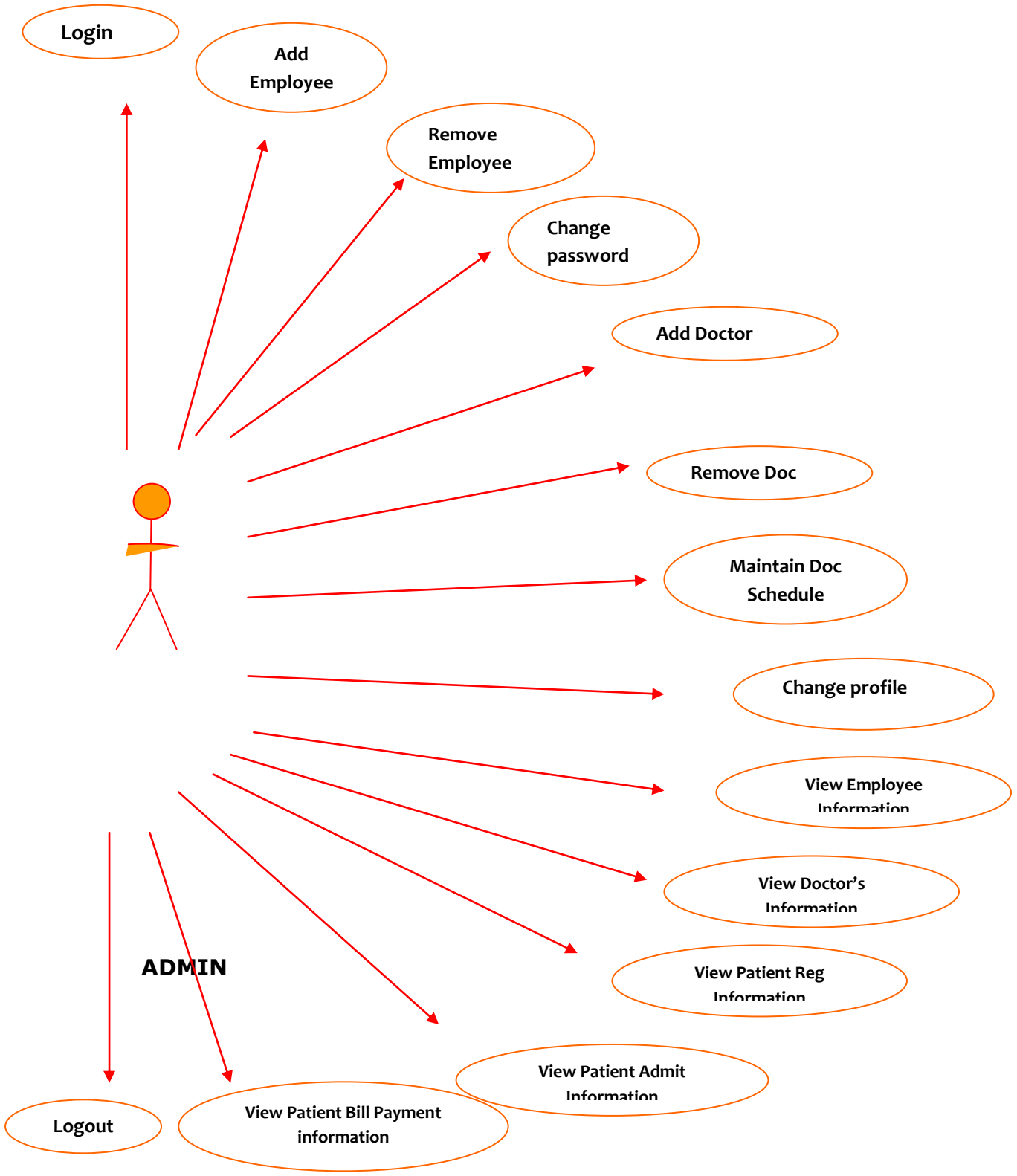


Figure: Employee Use Case Diagram

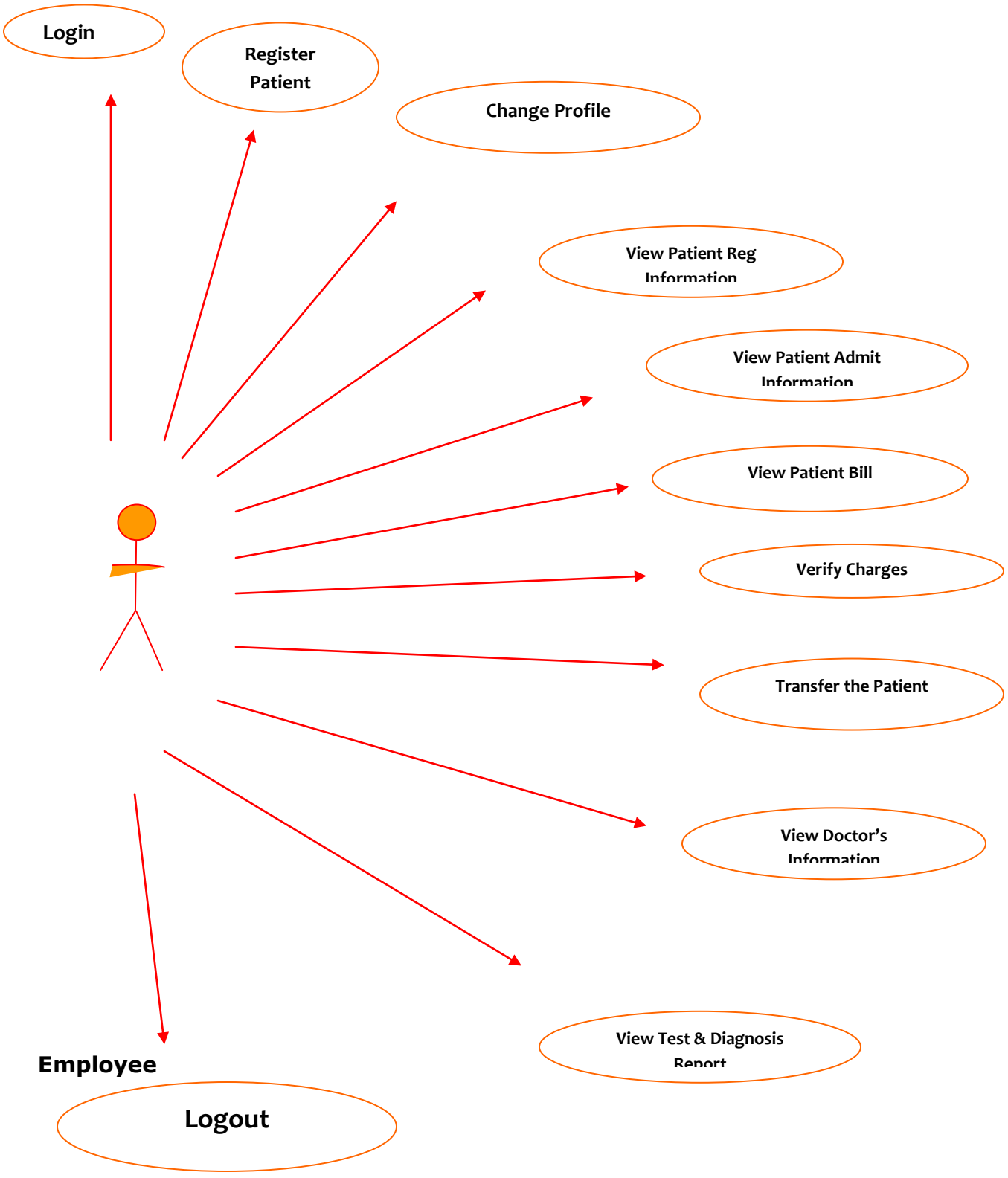
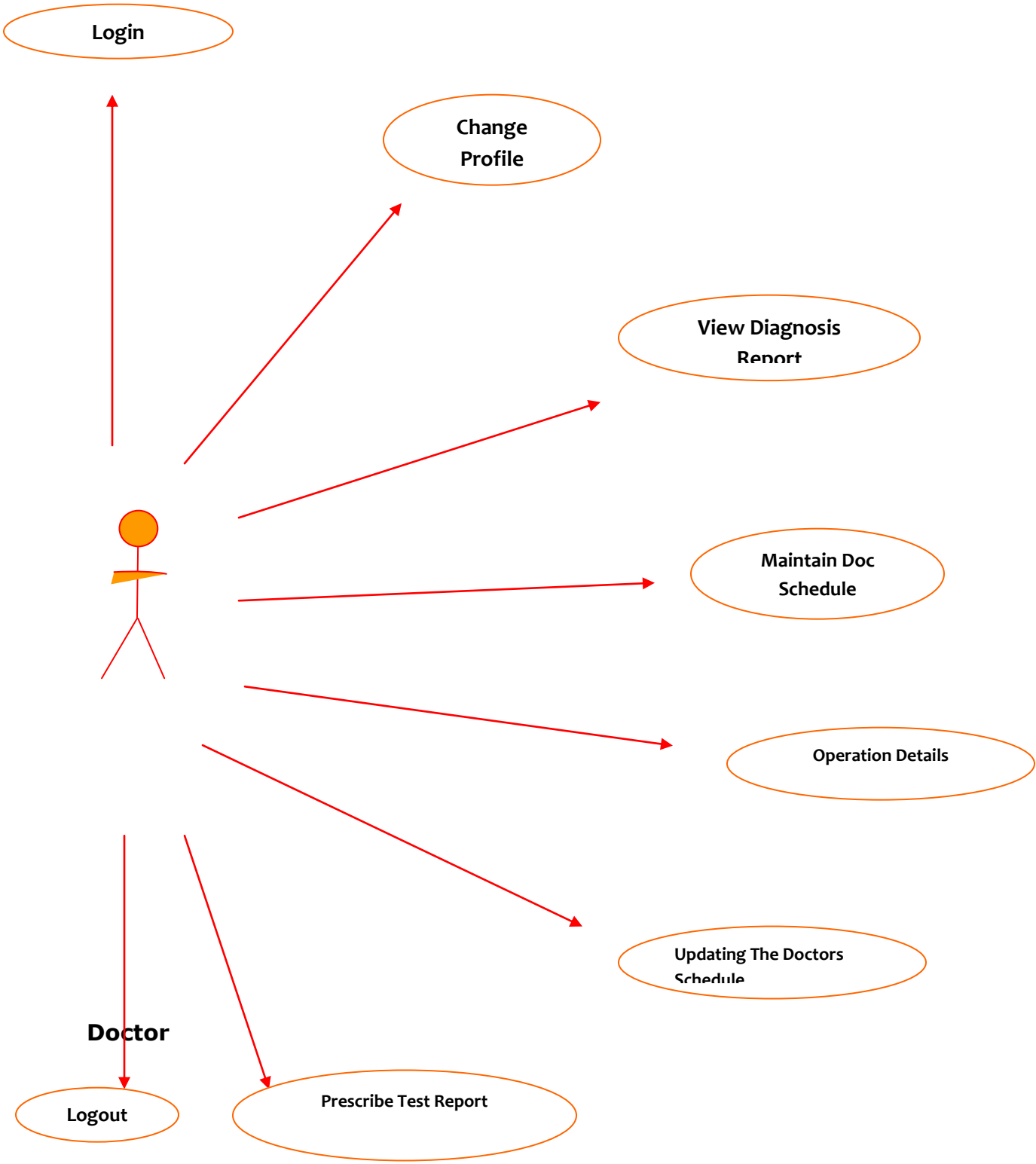
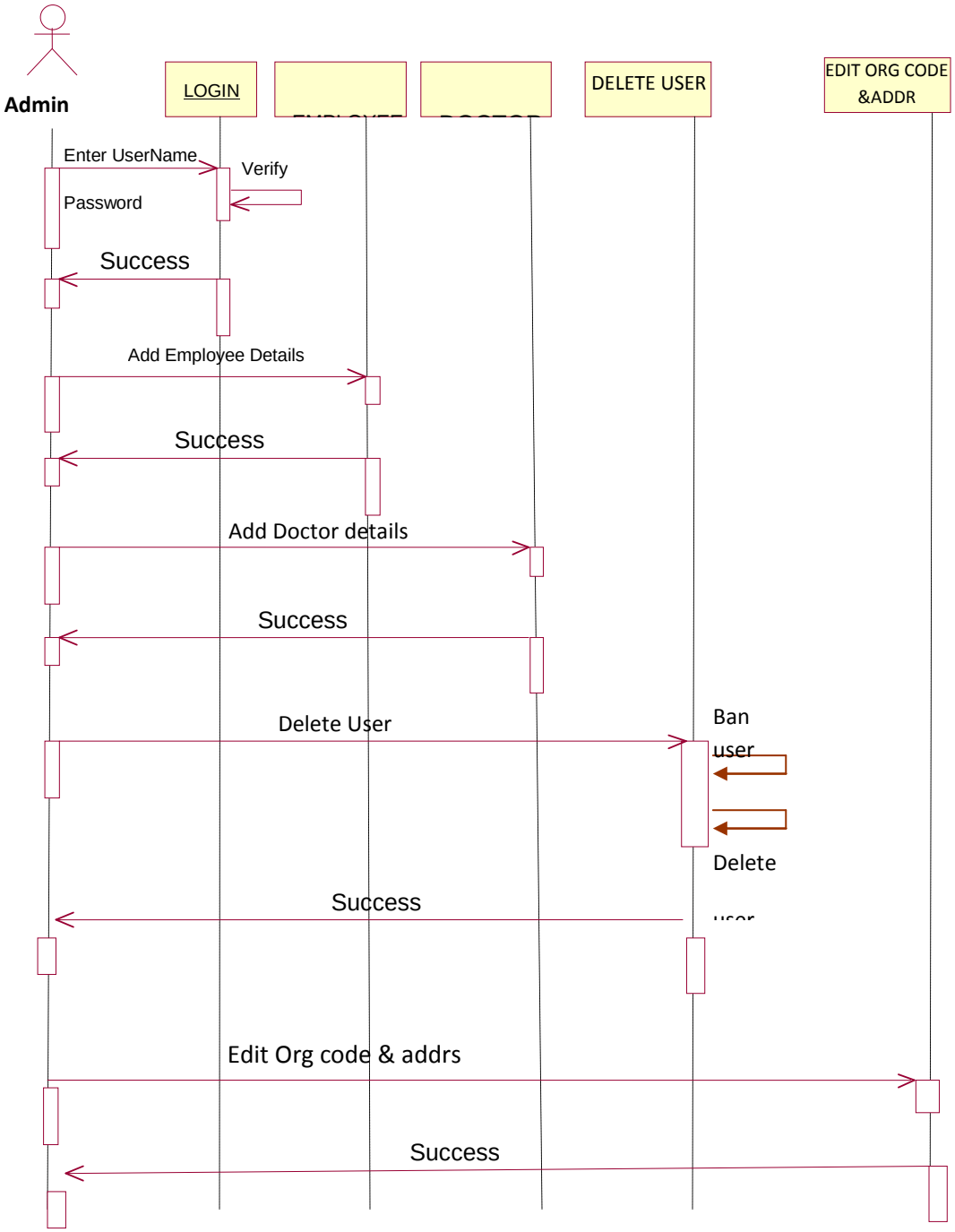


Figure: Doctor Use Case Diagram

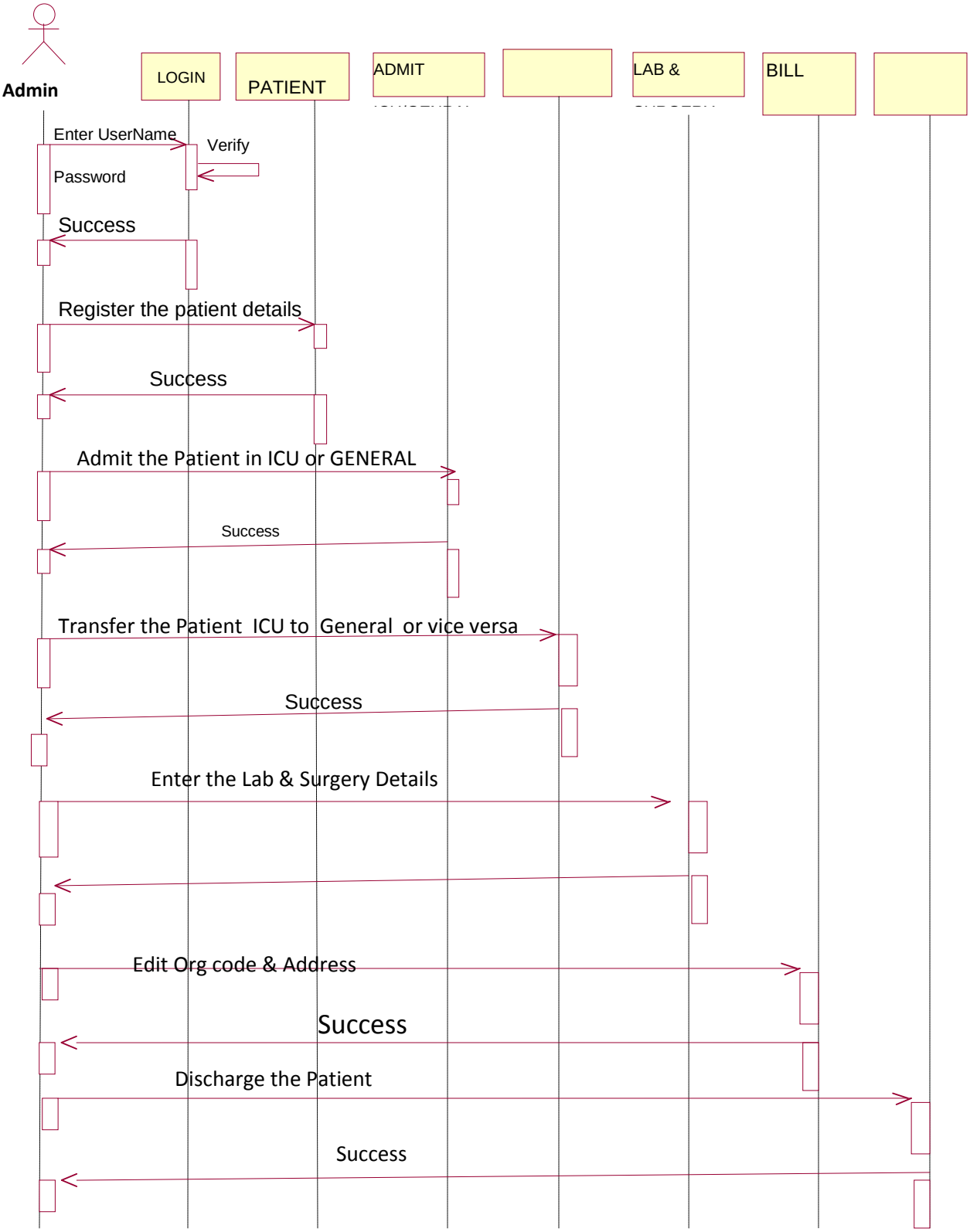


6.8. SEQUENCE DIAGRAMS

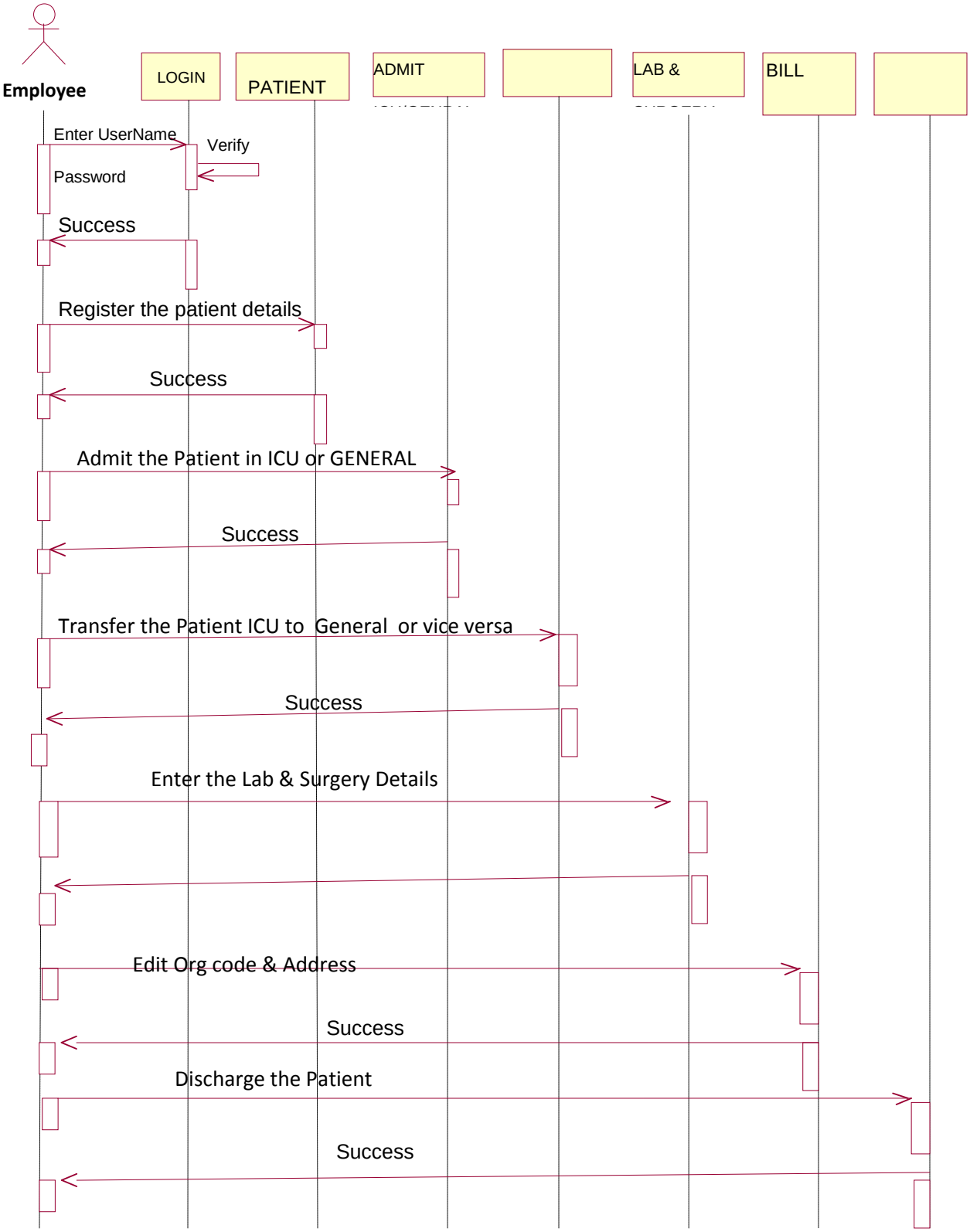
Sequence Diagrams For Administrator Activites:-



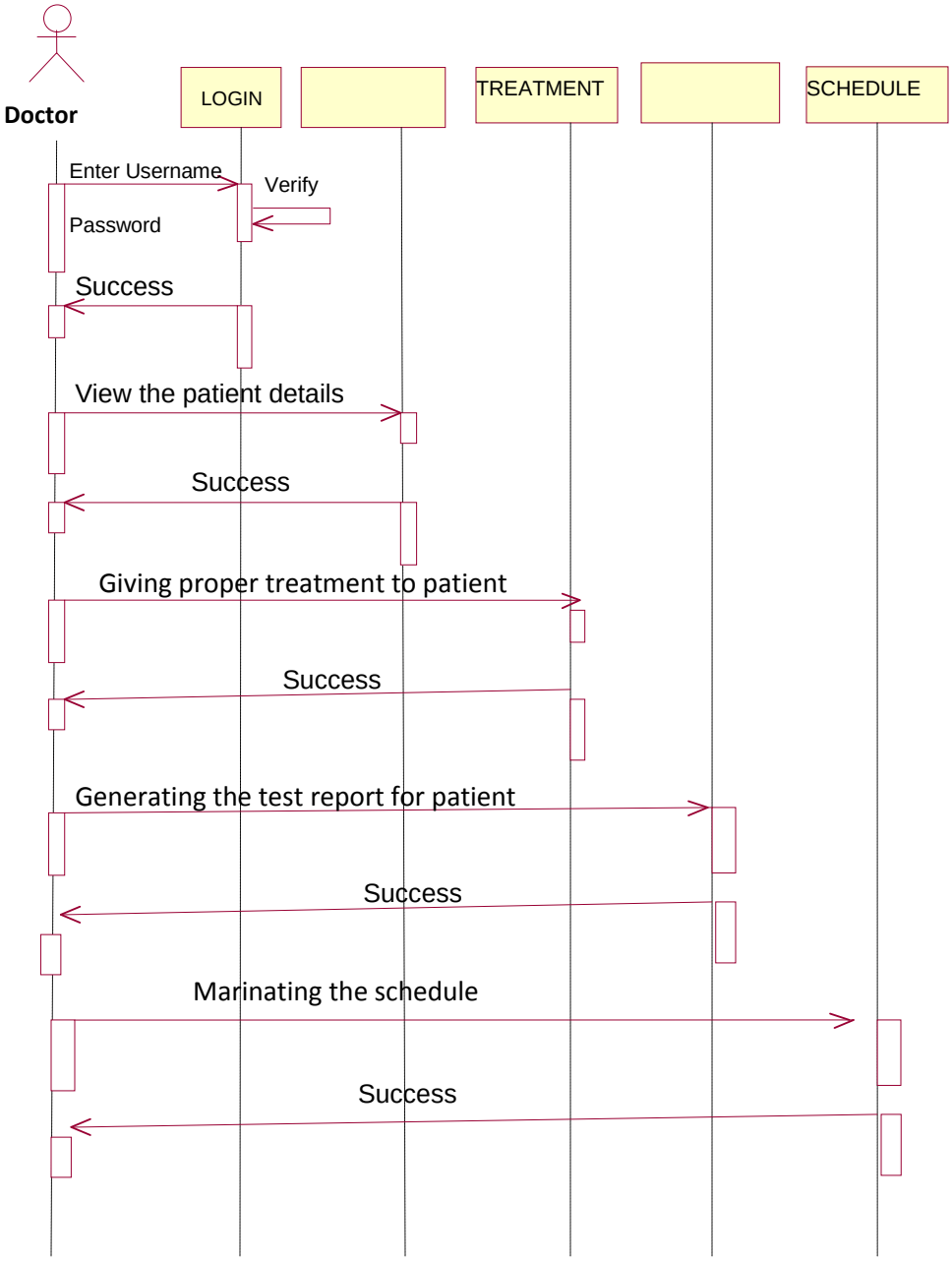
Sequence Diagram for Administrator Activities:-



Sequence Diagram for Employee Activities:-

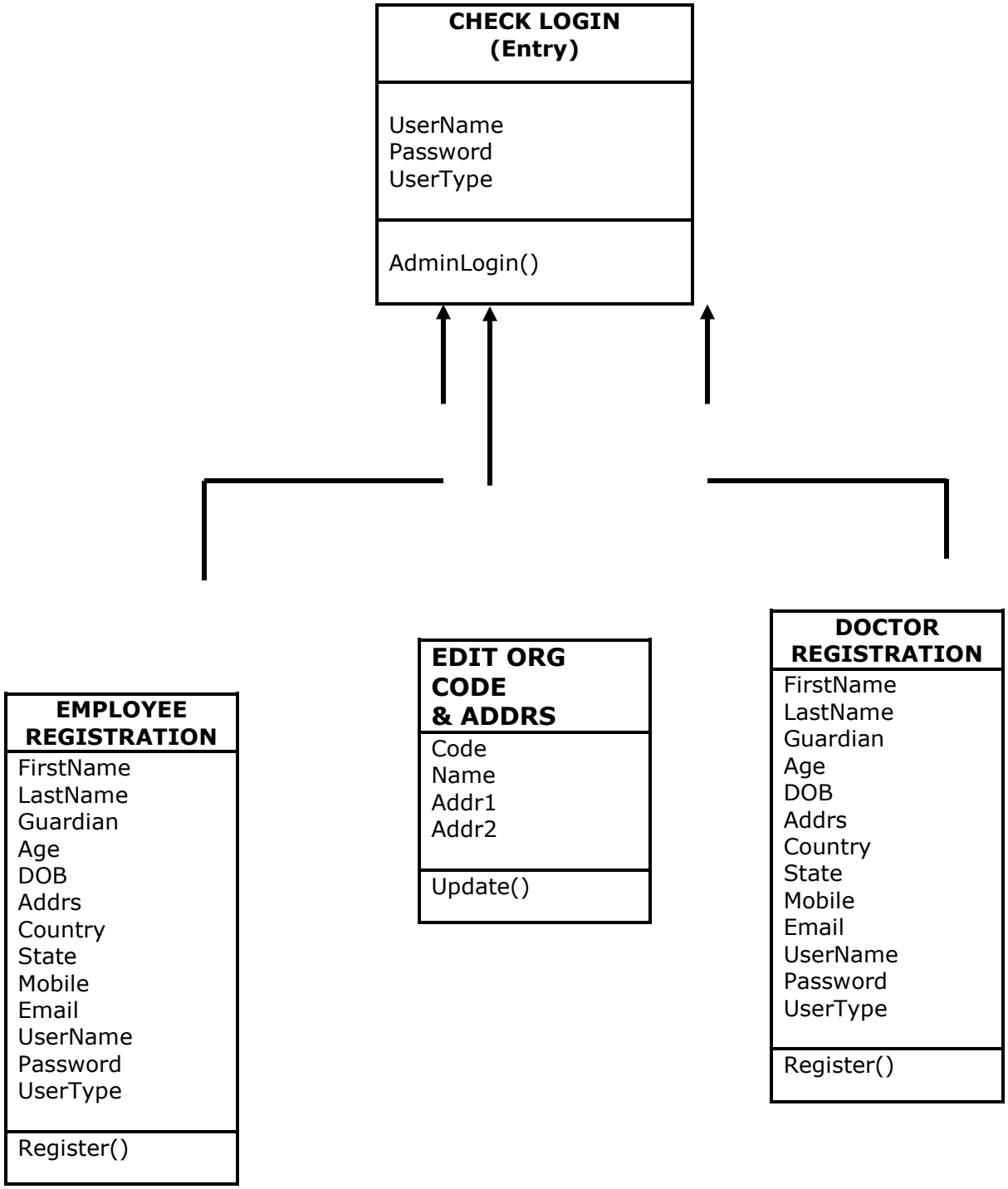


Sequence Diagram for Doctor Activities:-

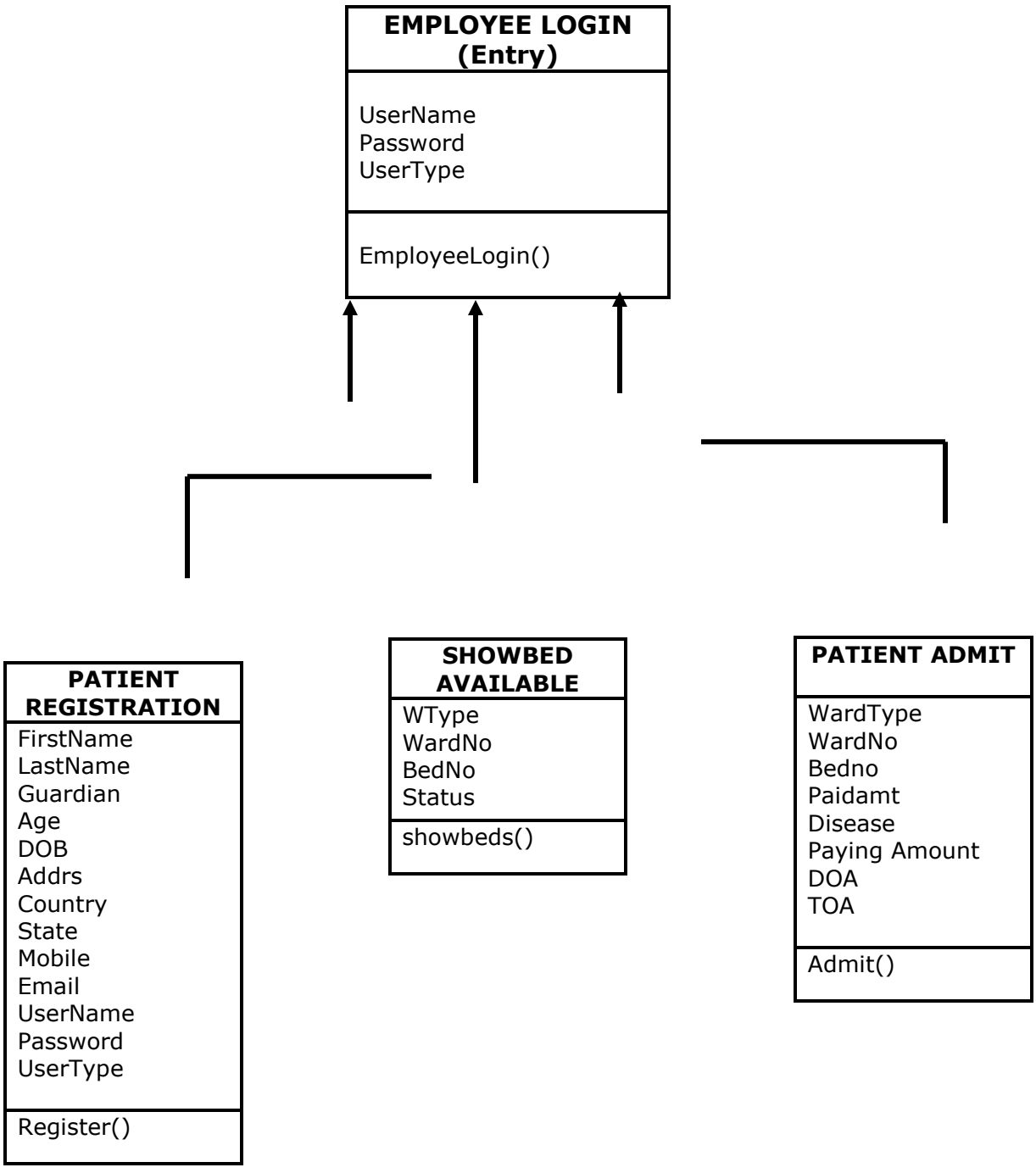


6.9. CLASS DIAGRAMS

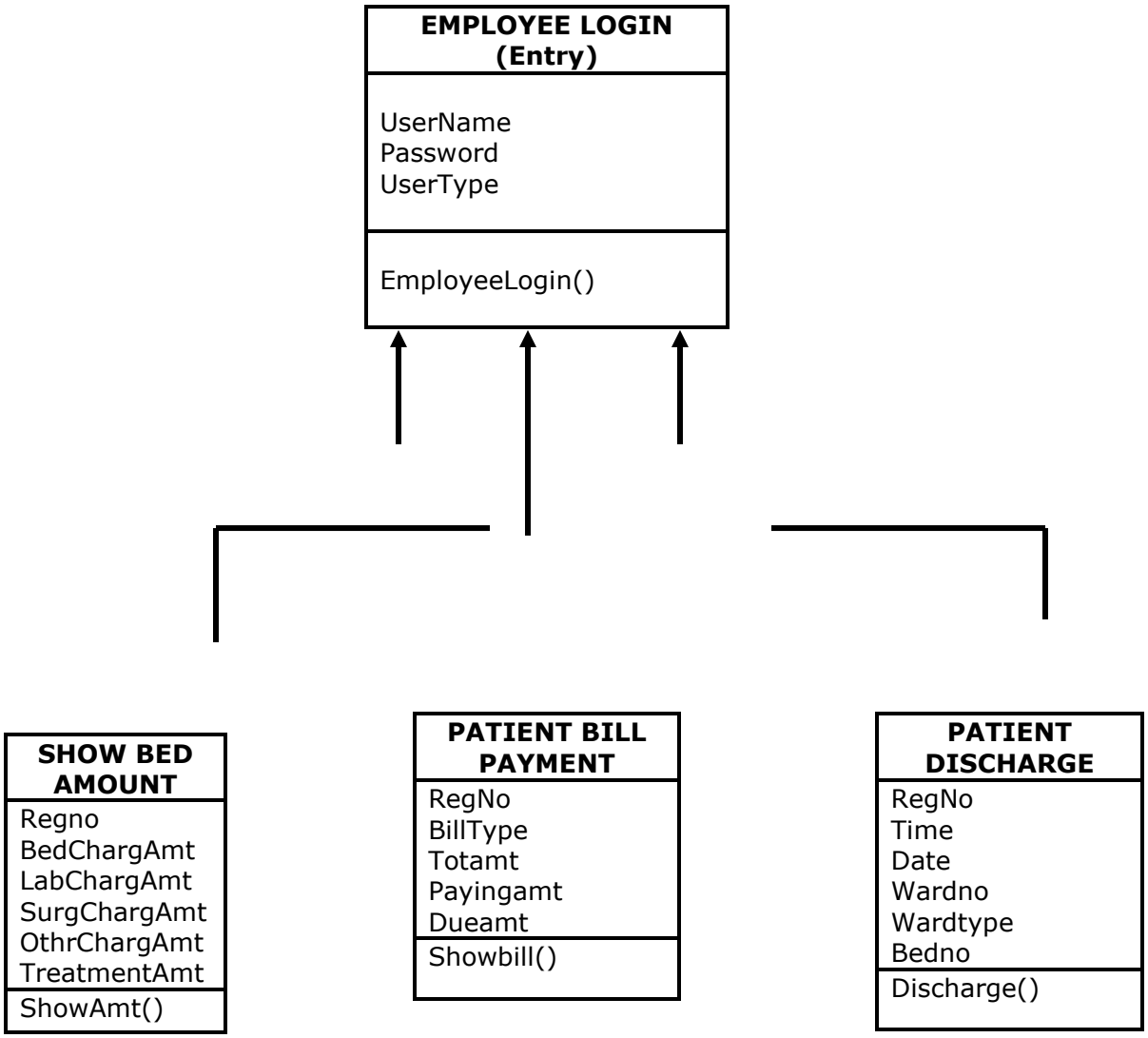
Class Diagram for Admin:-



Class Diagram for Employee:-



Class Diagram for Employee:-



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