1. <u>Introduction</u>

1.1 <u>Background</u>:

Hospitals are important health care organizations that depend on technology and require immediate support when it comes to technology issues. Most health-cares are connected to the network and IT systems and they always need to be functioning properly.

During the last decade, the computer industry has moved from the one-time development of massive software systems consisting of numerous subparts to the development of numerous subparts followed by a successive integration over time to ultimately create a massive software system.

Regardless of department, the common denominator is the patient. It follows, therefore, that the starting point when considering the development of a hospital software system must have something to do with the patient.

Every department within a hospital requires some or all of the patient's demographic information (e.g., name, sex, date of birth). The existence of such a facility is commonly termed a central registry.

The work performed by any department in a hospital is created by the people being treated as either inpatients or outpatients.

Thus, the existence of inpatient and outpatient functions is vital also.

Thus, three major Components are needed to form an initial software system for a hospital: central registry, inpatients, and outpatients. It is important that the system be designed in such a way as to permit the integration with software for other departments.

However this project is based on the inpatient department so we will cover only the information regarding the inpatient department as follows.

The inpatients function is commonly referred to as Admission/Transfer/Discharge, or more simply, ATD. When a patient is to be admitted, the user searches the central registry to determine if the demographic information about that individual already exists. If it does, it may be updated as necessary; if it does not, the user creates a central registry record. At this point, the patient is then admitted to the hospital when a specific service, admitting physician, and bed are assigned.

An additional facility is provided to permit the user to review all inpatients currently in the hospital. In many hospitals, patients can be pre-admitted and placed on a waiting list.

When the actual admission occurs, the information entered during pre admission is transferred to an inpatient status.

1.2 **Objectives**:

The objective of "In-Patient Management" is to provide such a system that can make the in-patient process automated.

The system will help the users for the following operations:-

- ➢ The patients' detail, their medical history information, tests reports that have been done during their stay in the hospital.
- ➢ The system will even help the users to keep details for medical prescriptions given to the patients.
- ➢ The system will be able to keep the staff detail (doctors and nurses) detail, their schedule of work etc.
- ➢ The system will help the nursing staff to allot bed to the patient after having look on the current booking status of bed i.e. whether it is being booked for other patient or not.
- ➢ The system will even help the users to do pre-admission of the patients and keep them on the waiting list.
- ➢ To produce discharge summary of the patients.

Purpose and Scope:

1.2.1 Purpose:

The "In-patient management" application helps hospital to reduce the paper work which is nothing but the traditional method of keeping the medical information about their patients. Thought traditional method doesn't affect the performance and quality of the service if there is no majority of patients in a hospital. But it becomes troublesome and time consuming when the staffs have to prepare all the necessary documents manually. The paper-based method can lead to duplication of data, loss of data, unauthorized access of the data etc.

So for remedy of such unpredictable troublesome, a hospital or health care centre should implement such application that helps them to work effectively in order to improvise the performance of their staff and making their medical information secured from the unauthorized users.

1.2.2 Scope:

The "In-patient management" application will cover almost all the operations of the in-patient activities. However, the aim behind developing this application is not limited to a particular department of a hospital. The management team of the hospital can decide to increase the number of medical services near in the future like

- ➢ Pharmacy.
- ➢ Outpatient services.
- ➢ Appointment booking of patients prior to their visit in the hospital.
- ➢ Doctor's daily working schedule.
- ➢ Emergency services.
- ➢ Home care services etc.

So in order to make new services process automated, there is need to update the application to cover all the services area of the hospital.

Therefore, the system can be broadly classified into different modules.

2. <u>Survey Of Technologies</u>

An application is a type of software that allows you to perform specific tasks. Applications for desktop or laptop computers are sometimes called desktop applications. Some desktop applications can also be used by multiple users in a networked environment. When you open an application, it runs inside the operating system until you close it. Most of the time, you will have more than one application open at the same time, and this is known as multitasking.

A vital process while developing desktop applications is the choice of technologies, on which the application will be build.

Why one does should prefer desktop application:

Following are the some of the reasons for preferring the desktop application for day to day operations:

1. <u>**Cost factor-**</u> Desktop applications are purchased one time and there are not continually occurring charges. However, in certain cases, maintenance fees may be charged.

2. <u>**Connectivity -**</u> Desktop applications are standalone in nature and hence do not face any hindrances resulting from Internet connectivity as in the case of web applications. Connectivity also significantly affects the speed at which desktop and web applications operate.

3. <u>**Security -**</u> One can have a total control over the standalone applications and protect it from various vulnerabilities. This may not be the case with web applications as they are open to a large number of users in the Internet community thus widening the threat.

There are plenty of technologies available to build desktop application. Some of them exist for life time and some of them are surpassed by the new technologies that can be used to build desktop applications within limited amount of time.

Today developers prefer to use the technologies like .NET, C#, PHP, ASP.NET, Java, SQL Server and Oracle for data storage etc.

However the "**In-Patient Management System**" according to its requirement can be developed using the following technologies:-

<u>.NET Technology</u>:

Microsoft .NET is a Framework which provides a common platform to Execute or, Run the applications developed in various programming languages. Microsoft announced the .NET initiative in July 2000. The main intention was to bridge the gap in interoperability between services of various programming languages. Various programming languages which can be used in .NET framework are C#, VB, C++, Jscript, ASP etc

The .NET Framework is designed to fulfill the following objectives:
- ➢ Provide object-oriented programming environment
- ➢ Provide environment for developing various types of applications, such as Windows-based applications and Web-based applications
- ➢ To ensure that code based on the .NET Framework can integrate with any other code

The .NET Framework consists of:

1. **The Common Language Specification (CLS)-**

   It contains guidelines, which language should follow so that they can communicate with other .NET languages. It is also responsible for Type matching.

2. **Base Class Libraries (BCL) –**

   A consistent, object-oriented library of prepackaged functionality and applications.

3. **Common Language Runtime (CLR) –**

   A language-neutral development & execution environment that provides common runtime for application execution.

C# (C Sharp):

C# is a language for professional programming. C# is a programming language designed for building a wide range of enterprise applications that run on the .NET Framework. The goal of C# is to provide a simple, safe, modern, object-oriented, high performance, robust and durable language for .NET development.

It enables developers to build solutions for the broadest range of clients, including Web applications, Microsoft Windows Forms-based applications, and thin- and smart-client devices.

We can implement the Object Oriented concepts like encapsulation, inheritance, and polymorphism in C# programming development. C# Coding style is very similar to C++ and JAVA, so the developers who are familiar with those languages can pick up C# coding quickly.

Advantages of C#:

1. C# language is projected to be a simple, modern, general-purpose, object-oriented programming language.
2. C# helps you to import a namespace and use the classes in a component—no COM plumbing or registry lookups required.
3. C# allows you to access memory directly using unsafe code blocks.
4. C# establishes better event management using delegates and supports conditional compilation & cross-language interoperability with any .NET language
5. C# is based on reflection mechanism which is biggest advantage of C#.

SQL Server:

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications which may run either on the same computer or on another computer across a network (including the Internet).

Microsoft markets at least a dozen different editions of Microsoft SQL Server, aimed at different audiences and for workloads ranging from small single-machine applications to large Internet-facing applications with many concurrent users.

Microsoft SQL Server 2016 Community Technology Preview 2.2 (CTP2.2) is the most recent pre-release version available. It was released on July 23, 2015.

Advantages of SQL Server:

1. **Reliability**:

With SQL Server the clients do not talk directly with the tables but with an intelligent data manager on the server. This in turn reads and writes data from and to the tables. If a client machine crashes, or the network hiccups, this will not affect the underlying tables; instead the data manager realises that the transaction has not been completed and does not commit the partially transmitted data to the database. The database therefore continues to run without problem.

The client/server system also maintains an automatic 'transaction log'. If a backup has to be restored the transaction log can be run and should restore all completed transactions up to the time of the crash.

2. **Data Integrity:**

Data integrity in SQL Server is enhanced by the use of 'triggers' which can be applied whenever a record is added, updated or deleted. This occurs at the table level and cannot thus be forgotten about, ignored or bypassed by the client machine.

3. **Performance:**

SQL Server is highly optimised and can usually perform the required filtering much more quickly than the client machine and secondly the amount of data sent across the network link is vastly reduced. For most databases the main performance bottleneck is data transmission over the network hence reducing this can give a really dramatic improvement in performance.

4. **Scalability:**

With the SQL Server client/server architecture many hundreds, or even thousands (with the appropriate infrastructure), of concurrent users can be supported without significant performance degradation.

3. <u>**Requirements And Analysis**</u>

3.1 <u>**Problem Definition**</u>:

The "**In-Patient Management**" is a windows application used to store the in-patient data. This application will help the staff to maintain the details like patient personal detail, medical history of patients, various test report data, staff details with their qualification and experience, bed status of a particular ward, pre-admission of patient, patient discharge detail etc.

The problem definition of the present system can be categorized as follows:-

1. <u>**Manual data management:-**</u>

Any hospital or health care centre who maintains the important data knows how difficult it is to maintain it manually. Such daily activities become tiresome work for the staff to maintain physical file for data management manually. It takes time for them to even search for a record entry and leads to waste of time and improper management. Manual management of data may even cause error prone calculation of reports, bills, treatment information etc.

2. <u>**Possibility of data loss:-**</u>

As discussed above, the data management is manual so there are possibilities of loss of data. This may cause due to any incident like fire, heavy rain etc.

3. <u>**Lack of immediate retrievals: -**</u>

The information is very difficult to retrieve and to find particular information like-E.g. - To find out about the patient's history or bed status of a ward, the user has to go through various registers. This results in inconvenience and wastage of time.

4. <u>**Preparation of accurate and prompt reports: -**</u>

This becomes a difficult task as information is difficult to collect from various register.

5. <u>**Lack of prompt updating:**</u>

Various changes to information like patient details or diagnosis details are difficult to make as paper work is involved. These may lead to waste of papers and redundancy of data and may lead to erroneous billing or medical reports.

3.2 **Requirements Specification:**

The **In-Patient Management System** requires the following specification to implement it on the clients' system. In order to make it operational, the client will have to login using the given account.

Hardware interfaces:

➢ Keyboard
➢ Mouse

Software interface:

| Name	Version	Source
Operating System	Windows 7 or higher version	Microsoft Corporation
SQL Server	2008 or higher	Microsoft Corporation
.NET framework	4.0 or higher version	Microsoft Corporation
Crystal Report	14.0.x or higher	SAP SE

Memory Constrains:

➢ The server would require a disc space of 40GB HDD.
➢ 1 GB RAM &
➢ System Processor 2.2 GHz or higher CPU.

3.3 **Planning and Scheduling:**

GANTT chart:

Weeks	1st 14/02/2016	2nd	3rd	4th	5th	6th	7th	8th
Requirement Gathering	████							
System/Data base Design		████	████					
Coding				████	████			
Creating scenarios and Test cases						████		
Unit Testing							██	
Functional/ Compatibility Testing							████	
Final Build								████

PERT Chart:

8
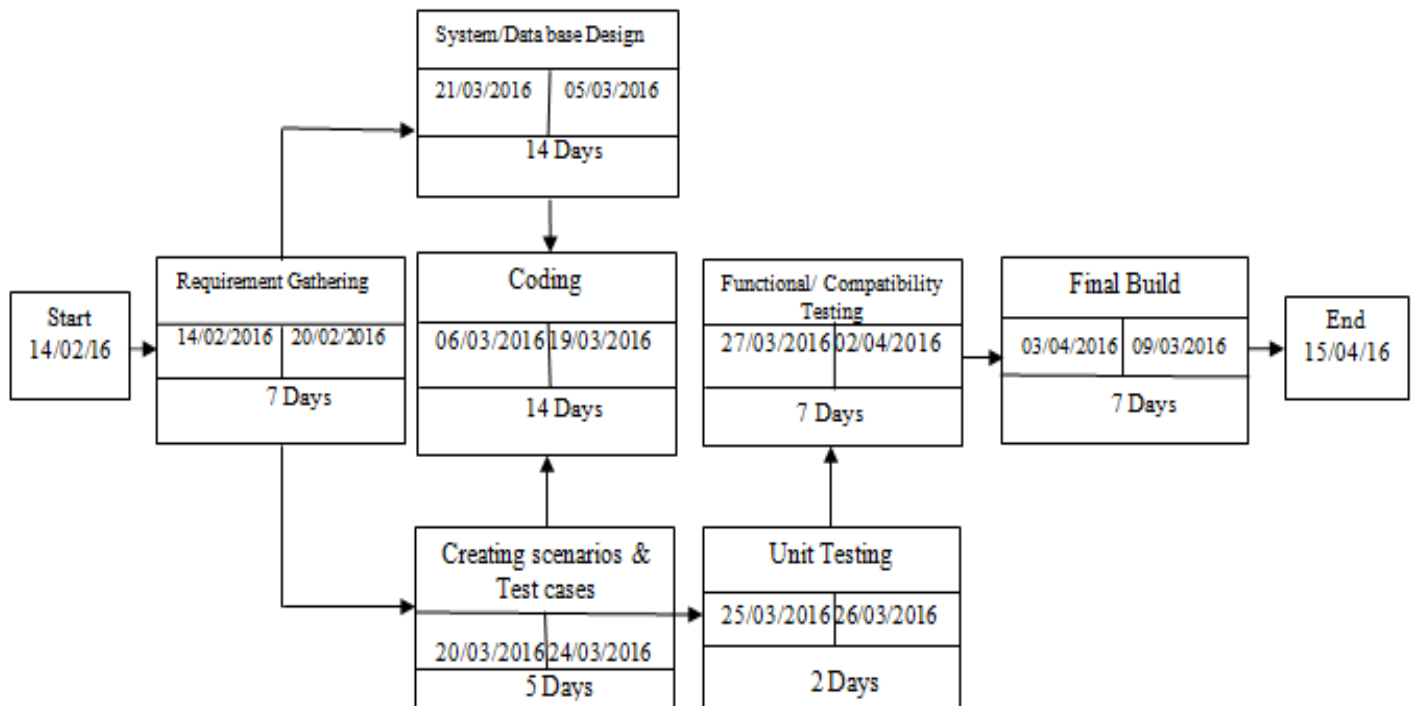
3.4 **Software and Hardware Requirements**:

3.4.1 **Software Requirements:**

IDE	MS Visual Studio 2012 with .NET Framework 4.0 or higher
Operating System	Windows 7 or higher version
Database	SQL Server 2008
Reporting Software	SAP Crystal Report 14.0.x or higher

3.4.2 **Hardware Requirements:**

Component	Minimum	Recommended
Processor	2.2 GHz	Dual processor up to 3.00 GHz
RAM	1 GB	2 GB
HDD	40 GB	40 GB
Mouse	1	1
Keyboard	1	1
Display	1024 x 768	1024 x 768 or higher resolution monitor or LED
DVD Drive	1	1
Network	56 kbps between client and server	56 kbps or higher between client and server

3.5 **Preliminary Product Description:**

The "**In-Patient Management System**" will help the hospital staff to maintain the patients' detail in order to carry the medical treatment, to keep patients' medical test detail, test reports, discharge summary, appointment staff to particular patient, prescription details etc.

This application will also be able to store the staff detail; doctors' detail with their qualification and specialization, nursing staff detail.

The application will be able to maintain the ward bed booking status with the help of which the staff will be able to decide when to call the next waiting list patients to admit them in the hospital for the treatment.

The primary goal of the application is to provide automated process to handle the daily activities to the staff so that they can reduce the possibilities of errors while maintaining the important data of the patients.

The application also has the login module for the doctor, nurses and other staff so that only the authorized person will be able to use the application. This will help to prevent the loss of data and miss use of the stored data.
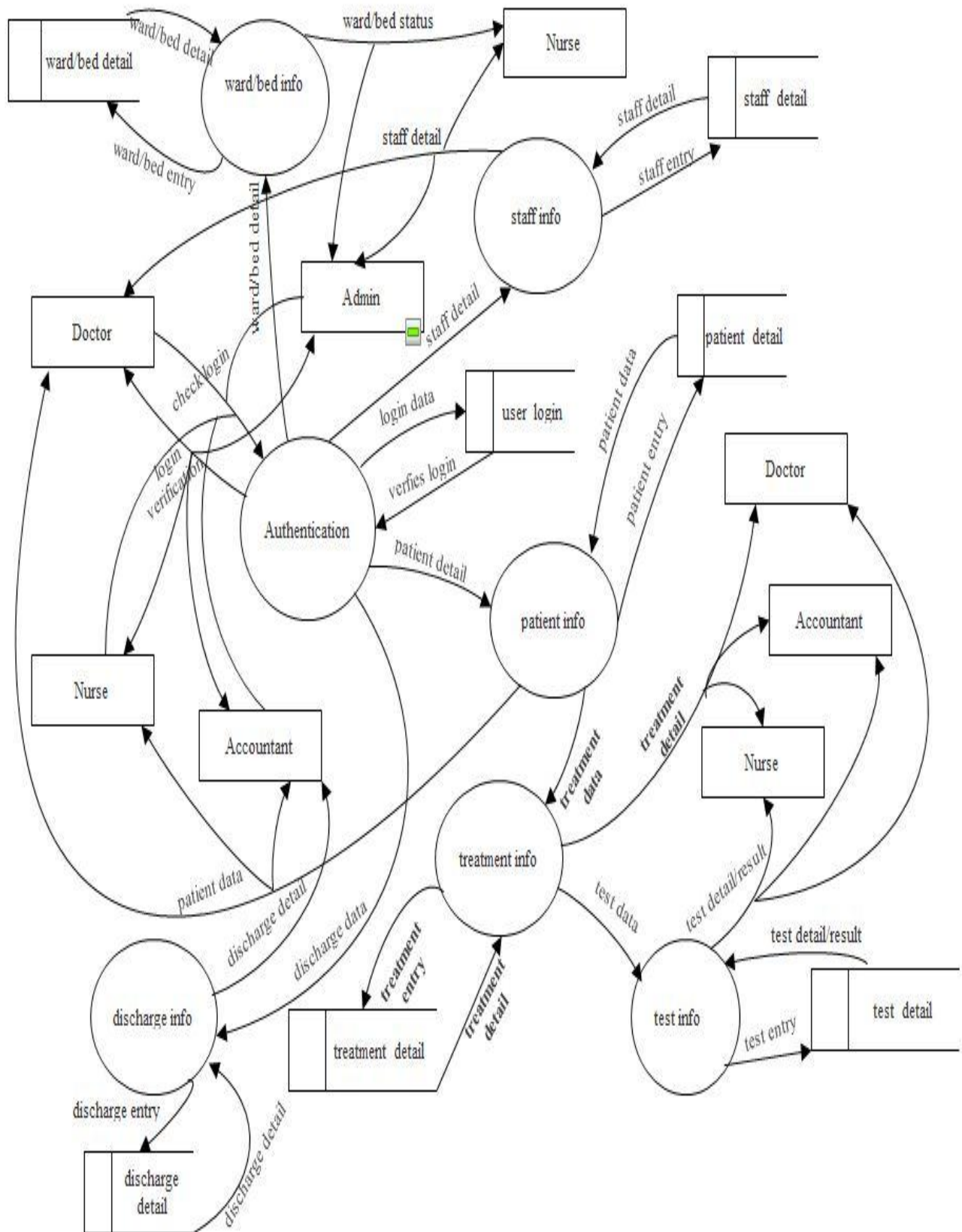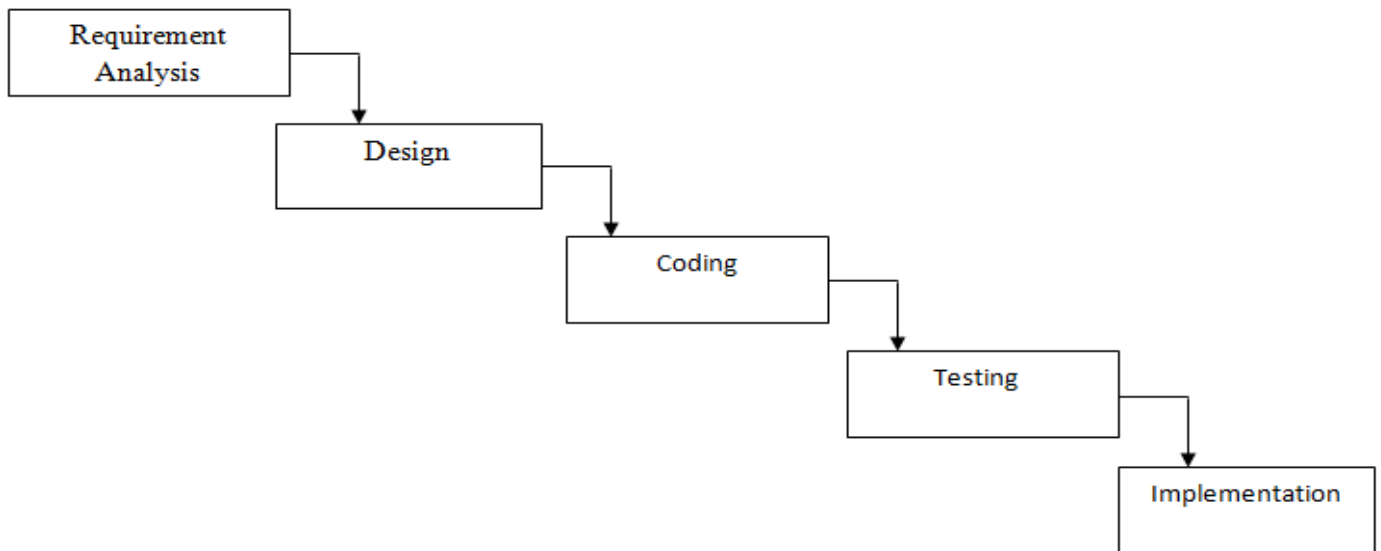
3.6 **Conceptual Models**:

DFD(Data Flow Diagram):

Level 0
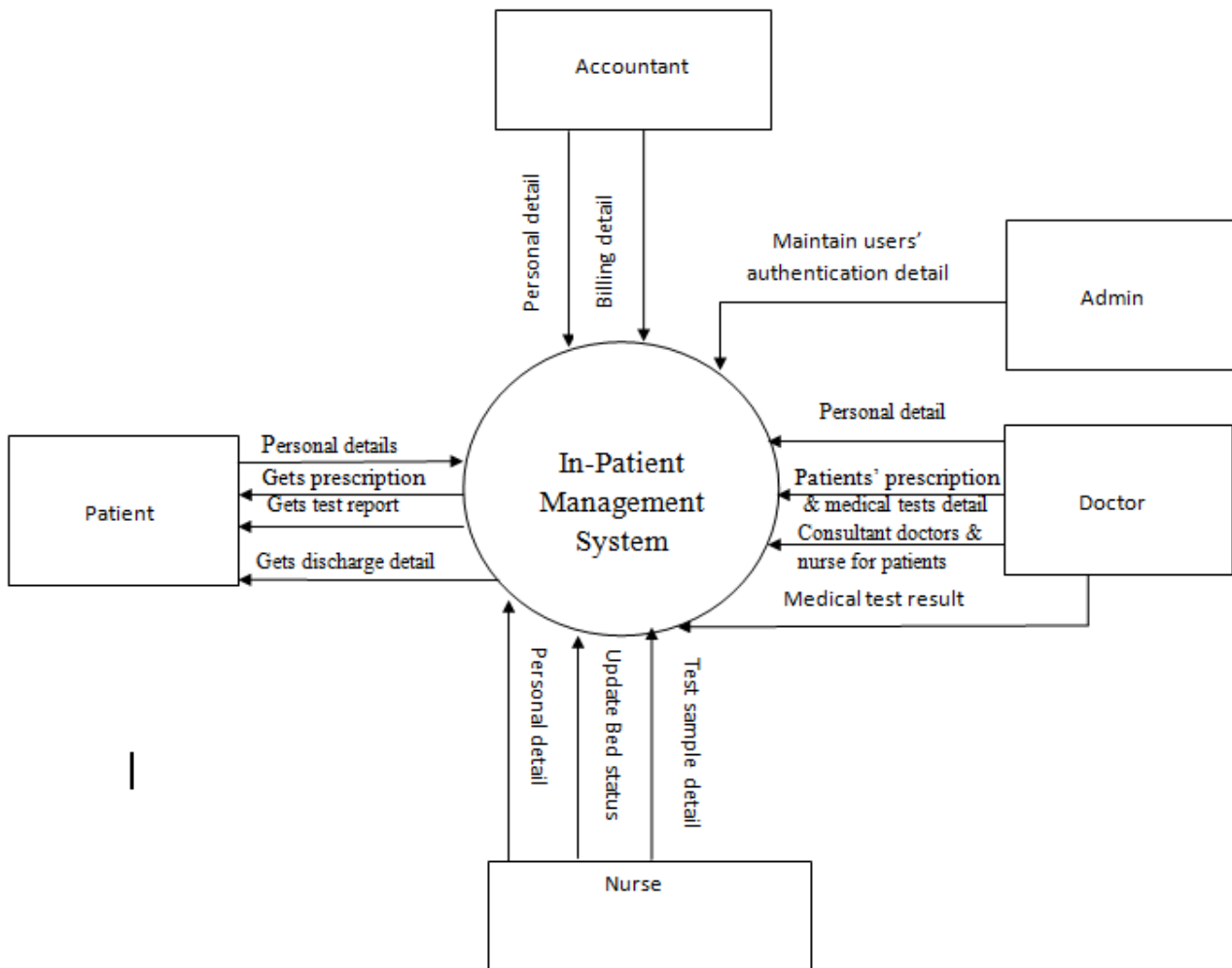
Level 1

4. Waterfall Model

5. References

http://www.pragimtech.com/c-sharp-video-tutorials.aspx
https://www.youtube.com/playlist?list=PL08903FB7ACA1C2FB&feature=view_all
http://vb.net-informations.com/framework/framework_tutorials.htm
www.stackoverflow.com