

# **Hospital information system**

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## **ABSTRACT**

A Hospital information system is a comprehensive, integrated information system designed to manage all the aspects of a hospital operation, such as medical, administrative and the corresponding service processing in this research will work on a four systems.

1. Patient registration system: where the patient can make an appointment for the clinic they want.
2. System Doctor: where the doctor can view the patient's medical record, diagnosis and depending on his condition either sends it to a laboratory for testing, or Writing the appropriate treatment.
3. Lab system: where are conducting laboratory tests of the patient and send the results to doctor.
4. Pharmacy system: where the medicine was given to the patient and to propose alternative treatment in the event of unavailability of treatment.

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## MOTIVATION

I look forward to search for a way to facilitate the procedures between the patient and the doctor and the laboratory and pharmacy, in order to reduce the time and effort and facilitate the retrieval of information about the patient.

## OBJECTIVE

Through this system, there are many important goals clear

We look forward to achieving these objectives, the most important of these goals:

- saving time, effort and accuracy.
- booking dates automatically through the system without error.
- provide space it takes files in the hospital.
- provide security and confidential files.
- save time and effort when searching for a specific file.
- The ability to save files as long as possible.

## METHODOLOGY USED

We will use the system development life cycle (SDLC) in developing our system, since it will help us to complete our required task efficiently.

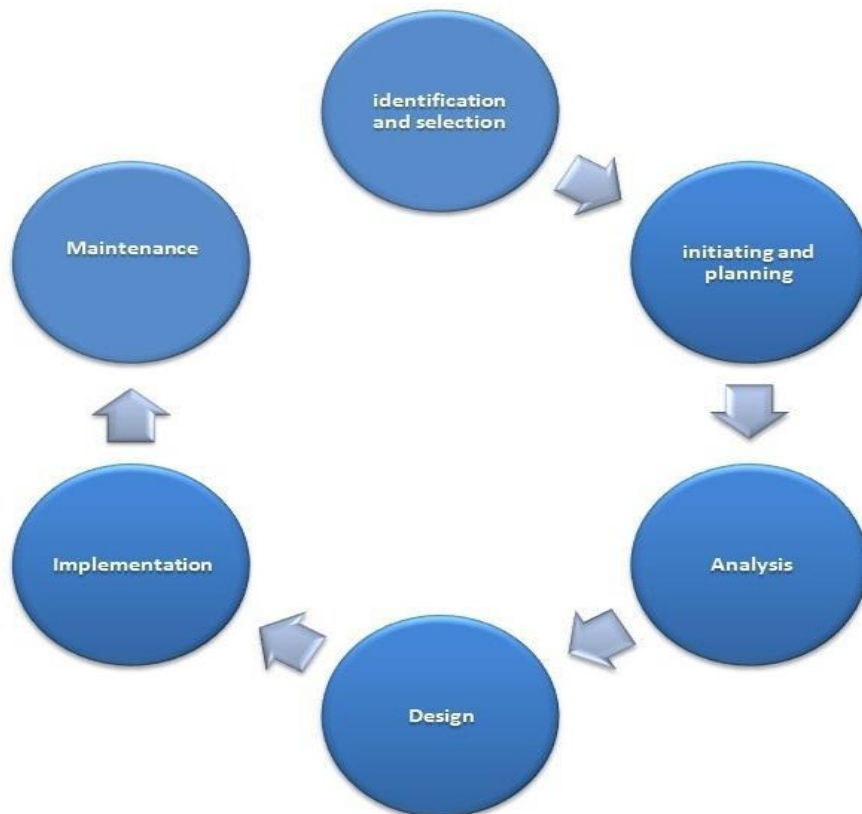


fig 1-1  
system development life cycle  
(SDLC)

## I. PROJECT IDENTIFICATION AND SELECTION

### A. *Problem Definition*

In the traditional system the patient go to the hospital to booking an appointment manually.

The doctor's diagnosis the patient's and on the diagnosis basis either sends it to the lab or propose to him the appropriate treatment and are keeping patient information on paper into a file .

all processes using the manual system and this leads to more time and more effort and more complexity in addition to the difficulty of retrieving data about patient and the possibility of loss information, And errors caused by handwriting.

### B. *Problem Solution:*

The current system works to save time and effort on the patient through the appointment booking system electronically without the need go to the hospital.

The current system can be retrieved from the doctor to the patient's medical record easily (diagnosis, lab tests, medication)

The current system can be speed the transmission of information between departments and reduce errors caused by handwriting and easily retrieve the information at any time.

Tools and application we will use:

#### A. *Programming Language :*

- PHP
- Web tools such as HTML , CSS, Ajax, JavaScript, jQuery, bootstrap

#### B. *Database*

- Apache Server
- MySQL

Software resource requirement:

Here we talk about major software requirement used on our system:

#### A. *Programs:*

- PHP
- SMART Draw
- IBM Rational Rose

## II. PROJECT INITIATION AND PLANNING

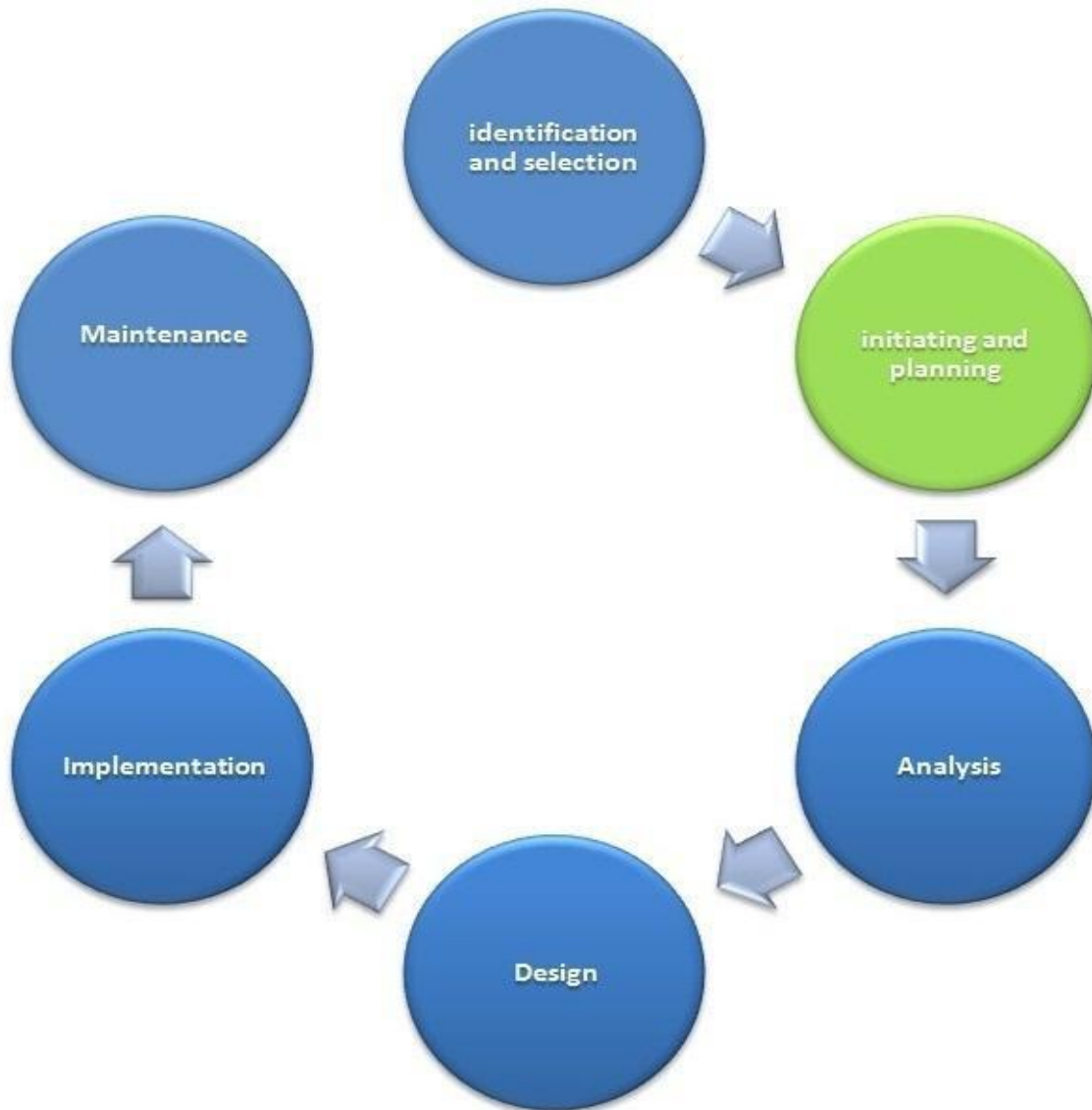
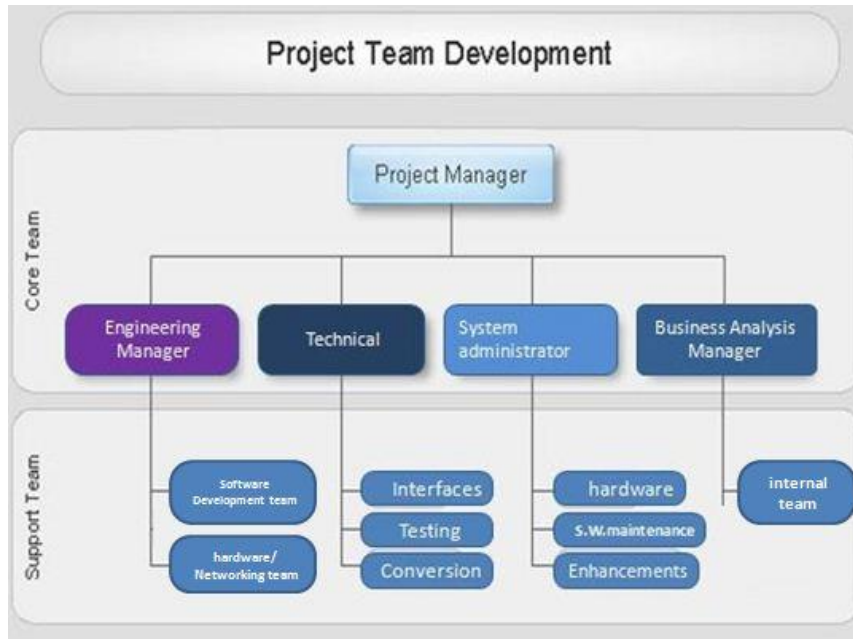


fig 1-2  
initiating and planning  
(SDLC)

## PROJECT ORGANIZATION

To Document How The Project Team Is Organized Into An Effective And Efficient Structure To Achieve The Project Objectives.

The Following Figure Shows The Team Members And Divided By The Work.

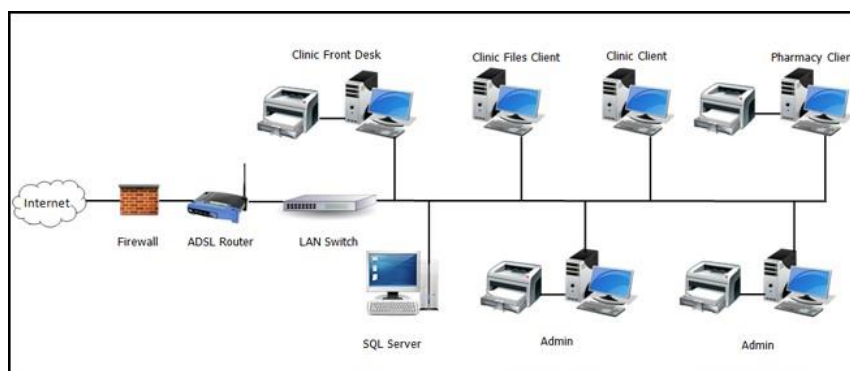


**Figure 1-3: The Structure of Organization Team**

Organizational Chart Is A Visual Planned, To Represent The Hierarchy For Explain Different Layers Of Management In The Company .

All Project Team Member Come From Different Organization For Part Of The Organization.

## HIS ORGANIZATION



**Figure 1-4: The Structure Of HIS**

- main server .
- Program Clinic Front Desk .
- Program Clinic Files Client .
- Program clinics Client .
- Program laboratory Client .
- program Clinic Pharmacy Client .

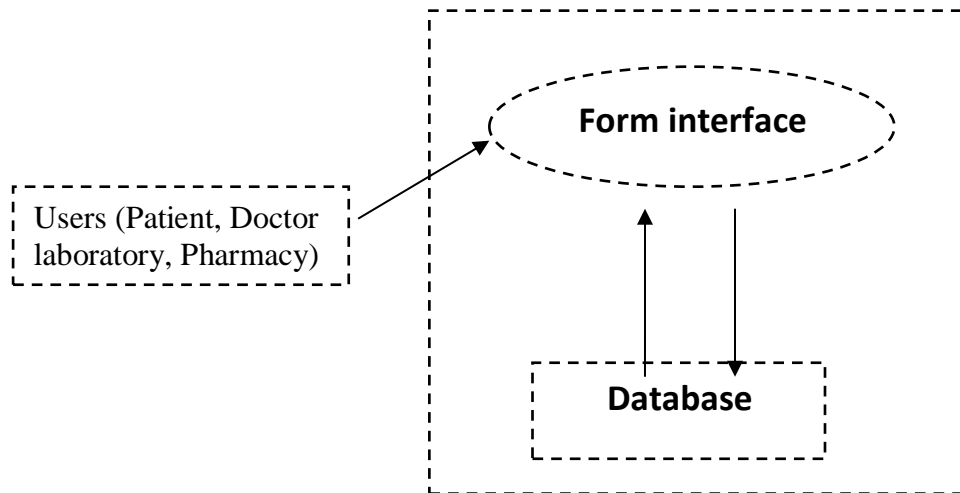
#### SCOPE

The scope of this system is to provide a way for the user's working area to be efficient, this system has a better working area since it provides a user friendly interface which leads to knowing every single feature of the system .

Also this system provides an efficient way of using for data.

#### SYSTEM BOUNDARY

A system boundary is a boundary that separates the internal components of a system from external entities. These entities can also be thought and be called as actors. In a use case diagram, a system boundary is represented by a rectangle that is drawn to enclosed the internal components of a system. Any entities outside the rectangle (i.e. the system boundary) are hence the actors.



**Fig 1-5**



## FEASIBILITY STUDY

A feasibility study looks at the viability of an idea with an emphasis on identifying potential problems and attempts to answer one main question:

Will the idea work and should you proceed with it?

We are discussed some of types of feasibility study in our project, such as:

- Financial / Economic Feasibility
- Technological Feasibility
- Operational Feasibility

### A. *Economic feasibility*

This system we create cost less than the traditional one concerning reports cost, Time, etc.

### B. *Operational feasibility*

This system we create is usable with solving many problems happened in the traditional one, e.g. paper files.

### C. *Technical feasibility*

Our goal is to create a system that we can develop using the new programming languages and technologies.

## RISK MANAGEMENT

In any computerized system, you must take into account the risks that could face this kind of systems. These risks include:

### A. *Technology risk*

we may face some problems with computers such as logical errors, networking problems, if it happened we will handle it.

### B. *People risk*

the user's may be can't deal with the new system, if it happened we will fix this by using some documentation or manuals or give them a training course that help them to do the right thing and deal with the new system.

### C. *Requirements risk*

We should have a flexible and clear understanding of the requirements to avoid miss-understanding.

So we will avoid the risks by a good risk management process, which is:

- Risk identification: Identify project, product and business risks.
- Risk analysis: Assess the likelihood and consequences of those risks.
- Risk planning: Draw up plans to avoid or minimize the effects of the risk.
- Risk monitoring: Monitor the risks throughout the project

## RISK PLANNING

Risk Planning is developing and documenting organized, comprehensive, and interactive strategies and methods for identifying risks.

<b>Risk</b>	<b>Risk Type</b>	<b>Probability</b>	<b>Effects</b>	<b>Strategy</b>
Requirement change:  There may be large number of changes to the requirement than estimated.	Requirement	High	Disastrous	Continuous review and update
Inconsistence or complete requirement.	Requirement	High	Disastrous	Review requirement periodically.
Time out: The specified time for the project not enough.	Estimation	Moderate	Serious	Make a strong commitment on our schedule.
Not have enough knowledge in our subject.	People	High	Serious	Make efficient search in this subject and study it.
Different part of the software may not integrate effectively.	Technology	High	Serious	Building effective algorithms for retrieving data.

Table 1: Risk Planning

## PROJECT SCHEDULING

Is A Timetable Shows, How Much Is The Expected Period To The Completion Of Each Stage

<b>#</b>	<b>Task</b>	<b>Duration</b>
1	Requirement collection	20 Days
2	Analysis	25 Days
3	Database Design	15 Days
4	Interface Design	10 Days
5	Implementation	20 Days
6	Testing	15Days

Table 2: Task And Duration

## GANT CHART

Is A Graphical Representation Showing The Date Of The Start And End Of Tasks And Useful For Depicting Simple Projects Or Parts Of Large Projects.

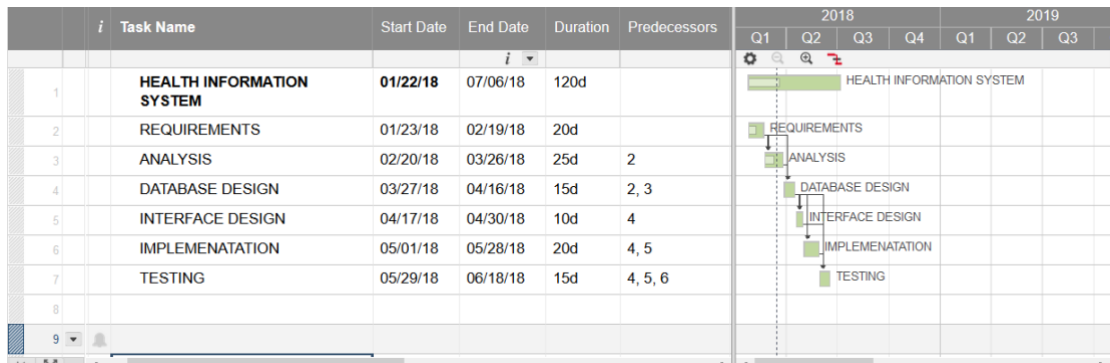


Figure 1-6: Gant Chart

## TASK-RESPONSIBILITY MATRIX

<b>Project:</b> Hospital Information Systems		<b>Prepared by:</b> Irfan Hussain, Abdul Qadeer, Azam Khan, Obaida Ananbah			<b>Legend:</b> primary (p) : Support(s)	
<b>Manager:</b> Obaida Anabah		Page 1 of 1				
Responsibility task matrix						
Task ID	Task	Irfan	Qadeer	Azam	Obaida	
1	Project identification and selection	Primary				
2	Project Initiation & Planning			Primary		
3	Analysis		Primary		Support	
4	Design			Support	Primary	
5	Implementation	Support	Primary	Support		
6	Testing	Support	Primary		Support	

### III. ANALYSIS

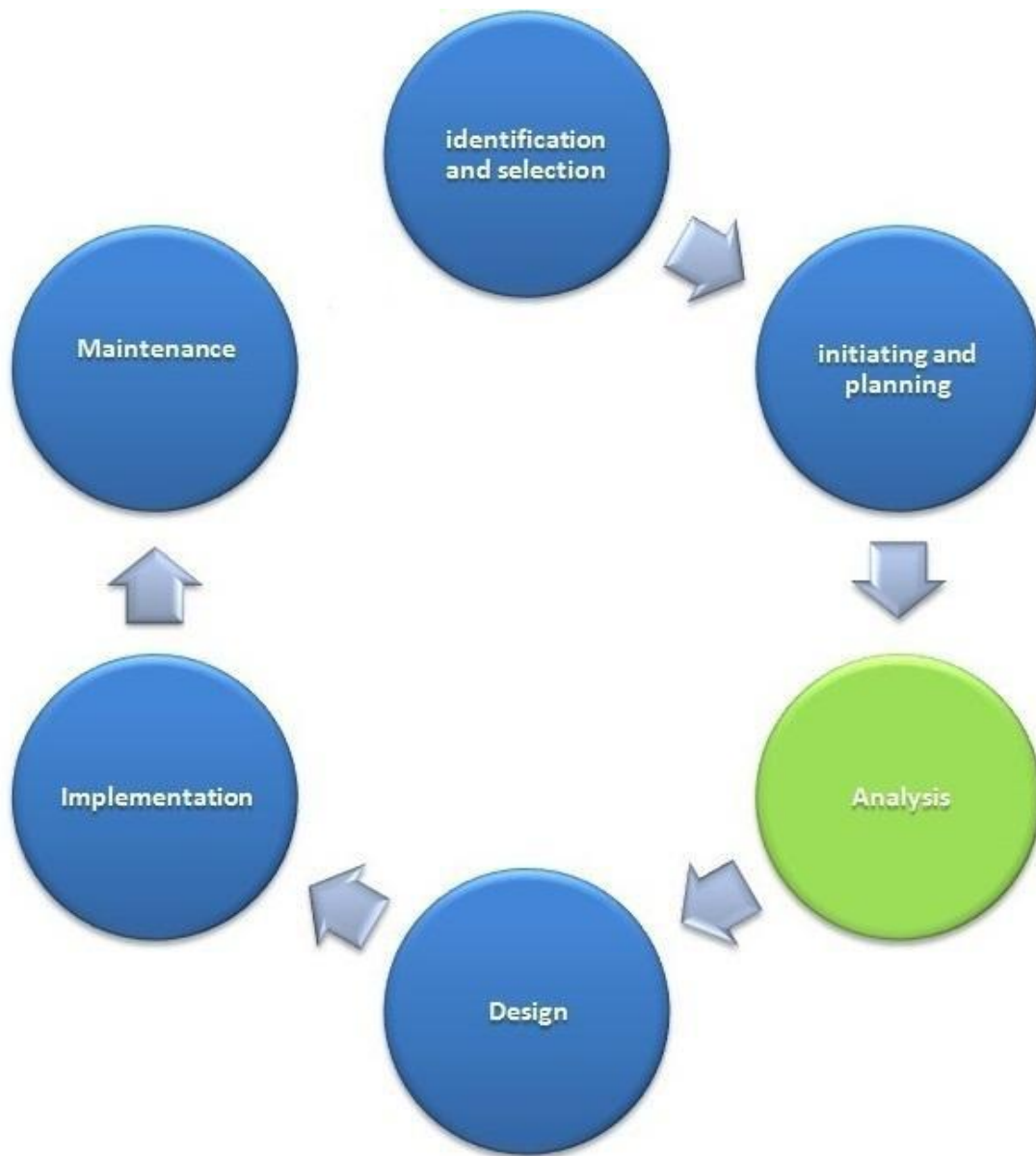


fig 1-6  
Analysis  
(SDLC)

## TECHNIQUES USED TO COLLECT REQUIREMENTS

Difficult To Resolve Problems If Do Not Know The Requirements Correctly, So There Are Many Techniques Available For The Collection Of These Requirements, And The Best Way When Collecting These Requirements Diversify Sources .

- Questionnaires
- One-To-One Interviews / Meetings
- Group Interviews / Meetings
- Following People Around

## BUSINESS REQUIREMENTS

Describe In Business Terms What Must Be Delivered Or Accomplished To Provide Value.

In This Project We Visited Some Health Centers And We Learn How To Work There And The Overall Expectations Of The System From The Business Perspective.

- Create, Retrieve, Update And Delete Records Information On Patients.
- Reservation Appointment According To the Patient and With the Possibility of Modification and Cancellation or Extension.
- Secure The Modification And/or Display Data On The Basis Of The Security Role Of The Recording.

## USER REQUIREMENTS

Managing User Requirements Information, Should Support

One or More of the Following Functions from This:

- The System Can Determine The Date Of The Next Visit To The Clinic.
- The System Must Keep A Complete List Of All The Patient And Their Data.
- The System Must Keep A Record Of Each Patient With Dr. Supervisor.
- The System Must Provide The Supervisors Reports About The Status Of Each Patient.

## REQUIRED HARDWARE AND INFRASTRUCTURE DEVICES

Is the Tools and Devices That Will Be Used In our System, As Shown In Figure 7



Figure 1-7: The Structure Required Hardware and Infrastructure Devices

- Computers.
- Printer.
- Reports & Logos.
- Networks Services.
- HIS.

## SYSTEM REQUIREMENTS

What The System Should Do?

- The System Should Provide List Includes The Patient Names, Gender, Age, and Id.
- The System Provide The Option For Adding, Updating, Delete The Patients.
- If The Patient Is New Patient Then The Employee Should Enter The Information Of The Patient.
- The System Should Check If The Patient Is Already In Database Or Not.
- The System Records The Full Details Of All Tests Conducted By The Patient At The Center.

## FUNCTIONAL REQUIREMENTS

The Best Definition To Functional Requirement Is What The System Should Do.

"A Requirement Specifies A Function That A System Or Component Must Be Able To Perform."

- This System Will Facilitate The Functioning Of A "Typical".
- Each Patient Should Have A Different ID.
- This System Will Facilitate The Functioning Of A Healthy Center.
- The System Should Save All the Record Information about Patient

## NON FUNCTIONAL REQUIREMENTS

The Best Definition To Non-Functional Requirement Is How The System Should Behave.

"A Non-Functional Requirement Is a Statement of How a System Must Behave"

- Availability: A System's Availability, And "Uptime," Is the Amount of Time That It Is Operational and Available for Use.
- Fewer Errors and Faster Execution
- Be Ready For Use on Any Type of OS.
- The System Shall Be Reliable Through Its Working
- The Process of Printing the Records Do Not Exceed One Minute
- The System Shall Be Secure.

## PROJECT REQUIREMENT ANALYSIS

In Analysis Phase We Determine How We Are Collect The Necessary Information For The Required System. So We Understand The System Scope And Specify The Functional, Non- Functional Requirements.

The System Can Reservation Appointments Automatically Through The Program Without Error.

- 
- The System Can Give Every Patient ID Number For Use Within The Health Center As An Identifier For The Patient, And It Must Be For Every Patient ID Number Is Different From The Other.
- 
- The System Will Provide History Reports for Patients, If the Patient Wants History Reports to Seek Treatment into another Center or To Insurance Companies, the System
- Process Modeling

### DATA FLOW DIAGRAM (DFD)

Graphically Illustrate Movement Of Data Between External Entities And The Processes And Data Stores Within A System.

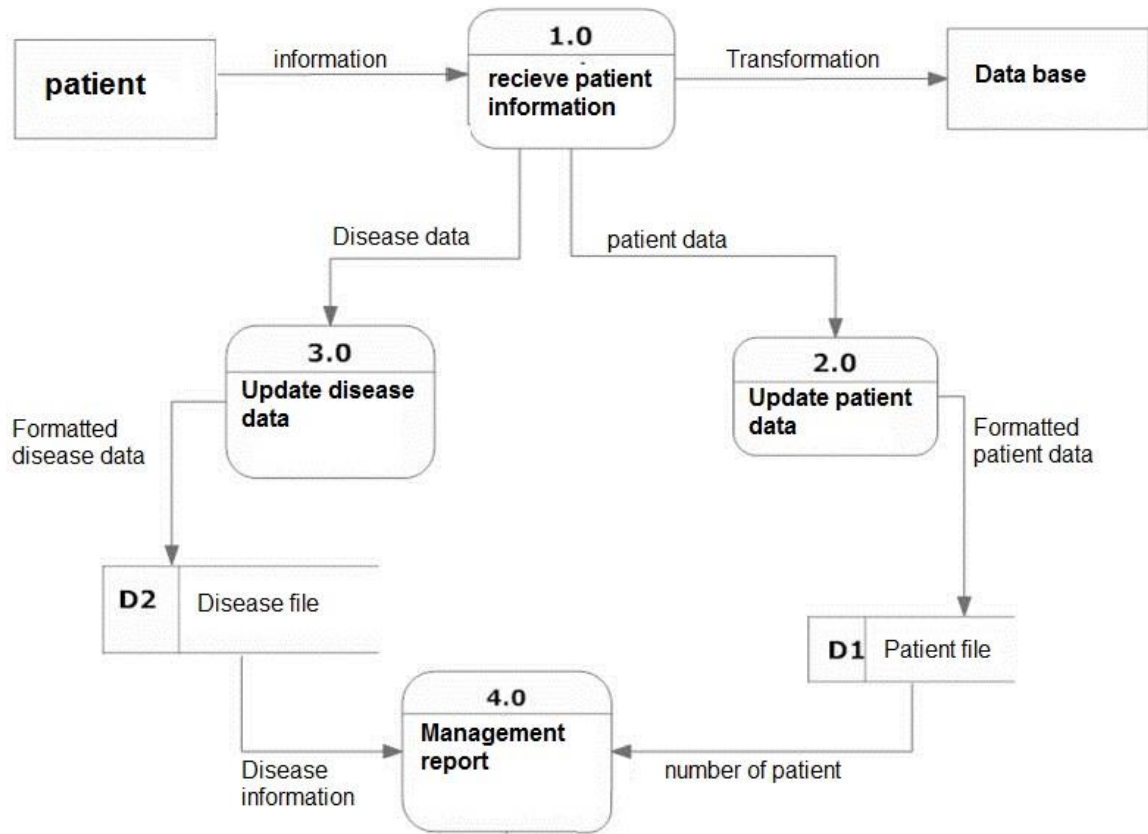


Figure 1-8: Data Flow Diagram (Level-0 DFD)



## USE CASES

A Description of a System's Behavior or Functionality under Various Conditions as the System Responds to Requests from Users.

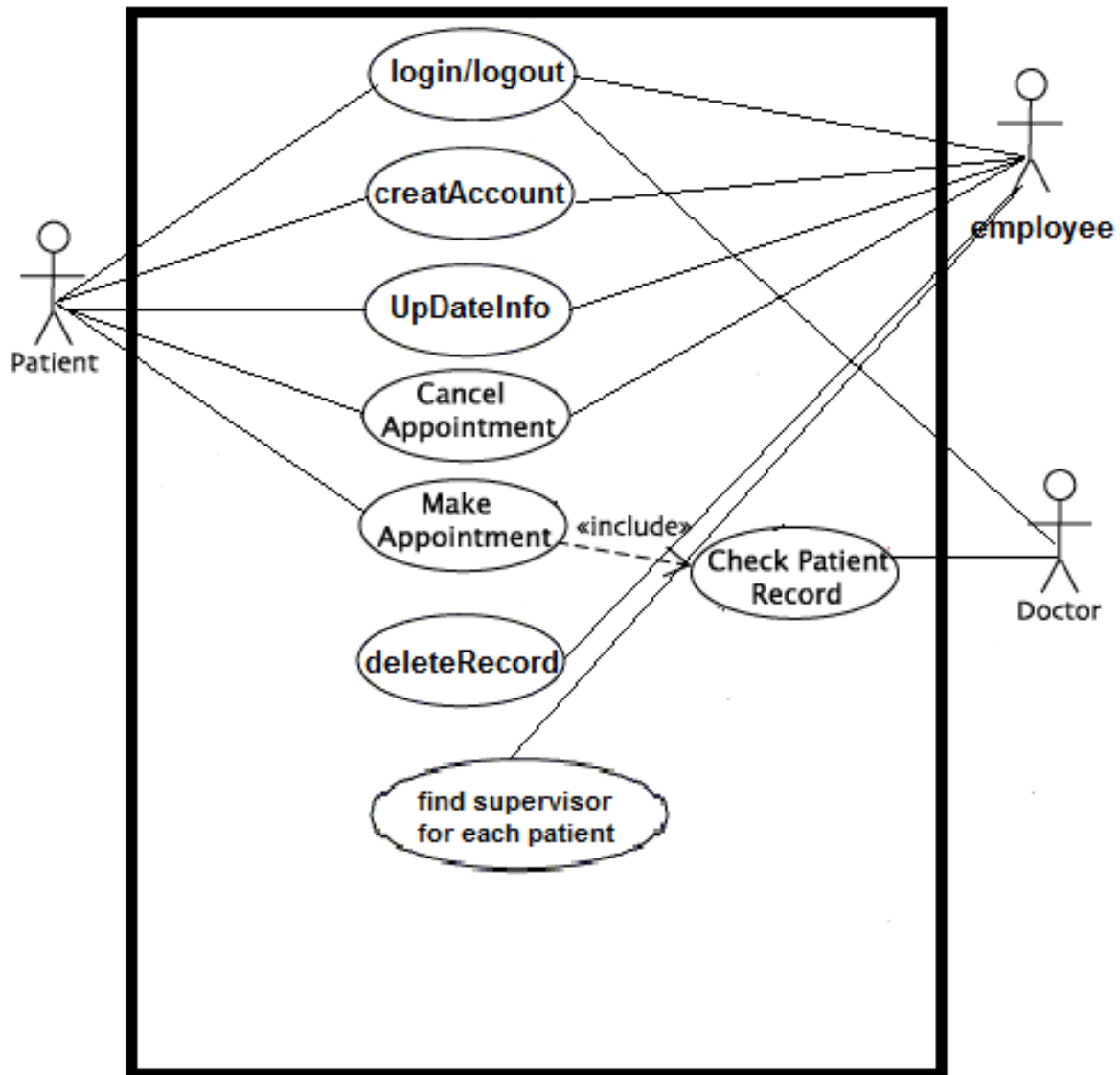


Figure 1-9: Use Case Diagram

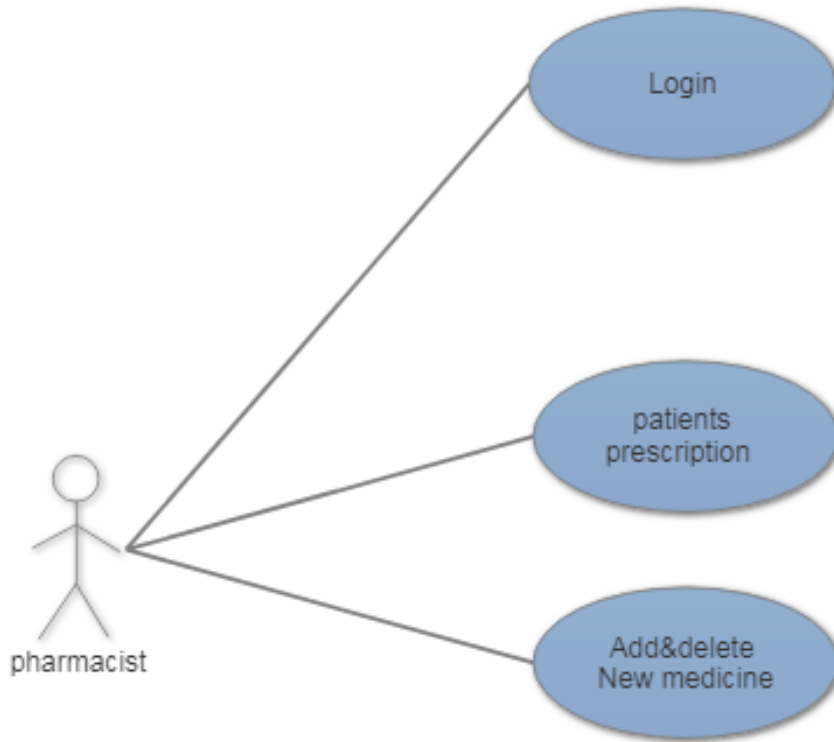


Figure 1-10: Pharmacist Use Case Diagram

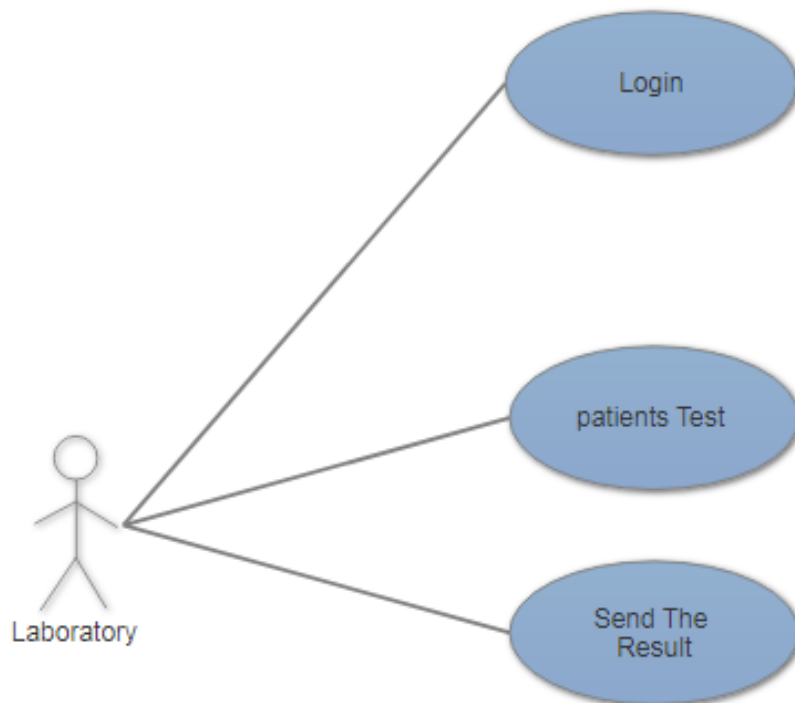


Figure 1-10: Laboratory Use Case Diagram

## STRUCTURE ENGLISH

Describe Function Using English In Way Similar To Programing Language.

```
IF ID =("ID_ correct");  
AND  
IF appointment != ("any another appointment ");  
Then allow to reservation appointment in  
system;  
Else  
Make a check on the  
ID_number;  
Or  
Appointment _Date;  
End:
```

Figure 1-11: Structure English

## DECISION TREE

We use the decision tree to represent part of the system logic which is the log in operation.

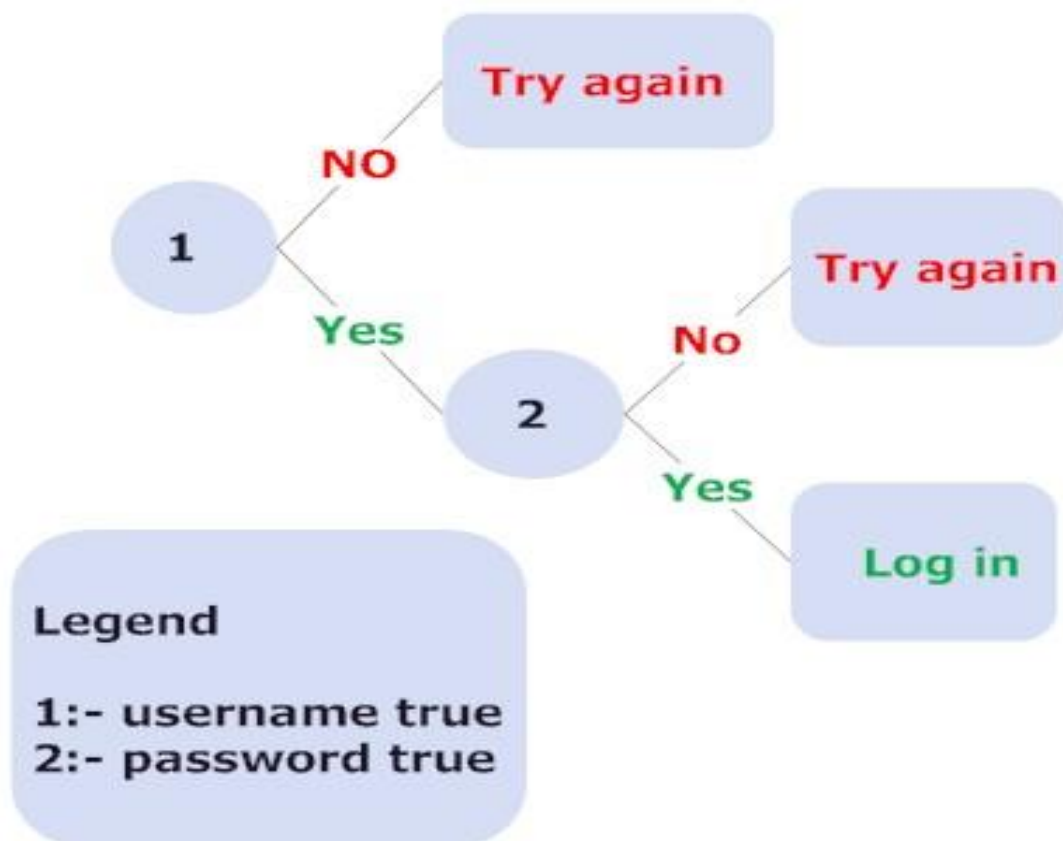


Figure 1-12: Decision tree

## DATA MODEL

### The ER Diagram of the Database

Logical Representation of the Entities, Associations and Data Elements for an Organization or Business Area.

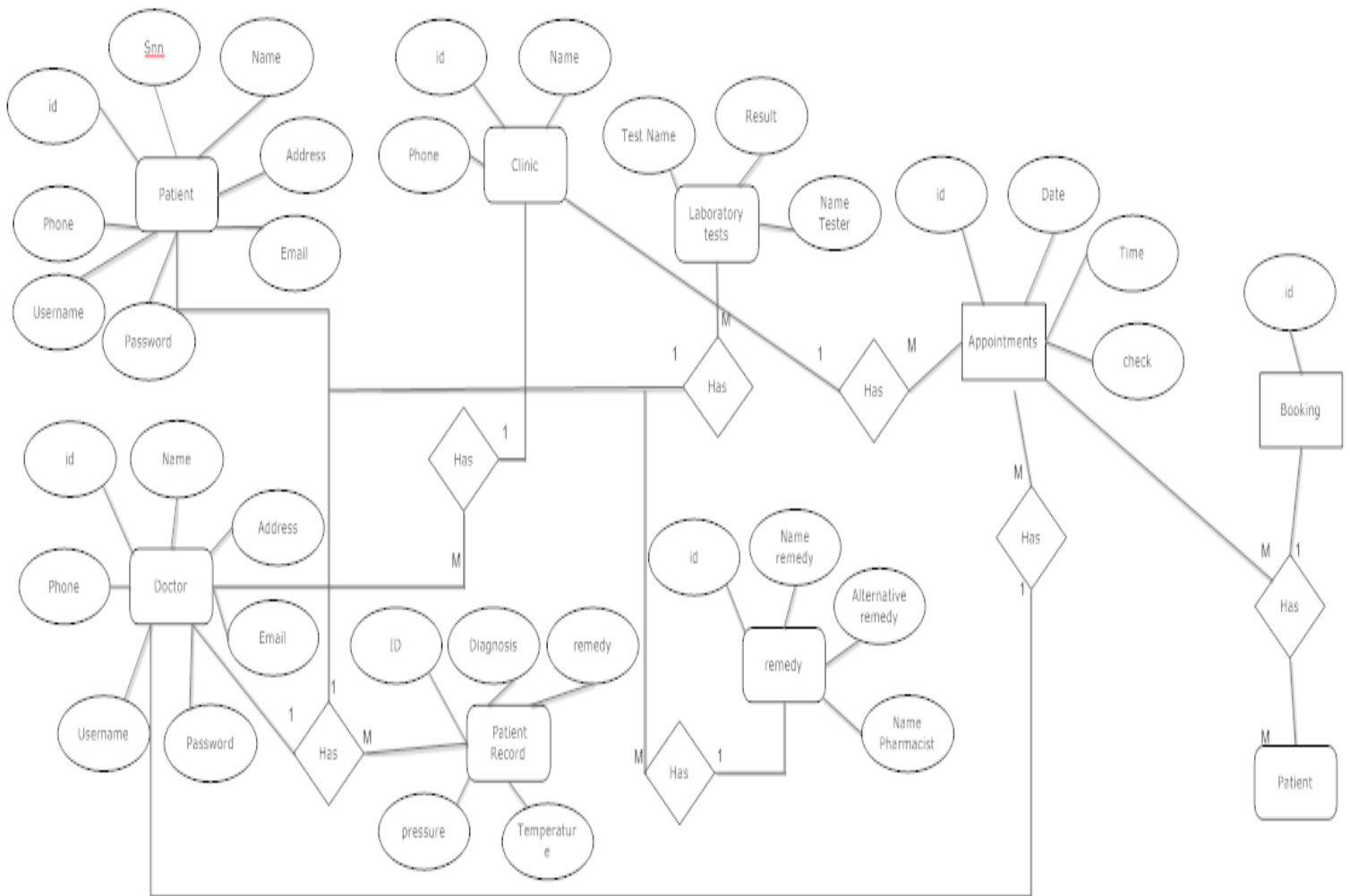


Figure 1-13: ER Diagram

## SCHEMA TABLES

### Patient

Id	SNN	Name	Address	Email	Phone	username	Password
----	-----	------	---------	-------	-------	----------	----------

Id is unique field refers to Identification number as Primary Key.

### Clinic

Phone	Name	Id
-------	------	----

Id is unique field refers to Identification number as Primary Key.

### Laboratory Tests

Id_Patient	Name Tester	Result	Test Name
------------	-------------	--------	-----------

Id\_Patient is Foreign Key reference by Patient table.

### Doctor

Id	Name	Address	Email	Phone	User Name	Password	Id_clinic
----	------	---------	-------	-------	-----------	----------	-----------

Id is unique field refers to Identification number as Primary Key.

Id\_clinic is Foreign Key reference by clinic table

### Remedy

id	Name Pharmacist	Name Remedy	Alternative Remedy	Id_Patient
----	-----------------	-------------	--------------------	------------

Id is unique field refers to Identification number as Primary Key.

Id\_Patient is Foreign Key reference by Patient table

### Patient Record

id	Pressure	Temperature	Diagnosis	remedy	Id_Doctor	Id_Patient
----	----------	-------------	-----------	--------	-----------	------------

Id is unique field refers to Identification number as Primary Key.

Id\_Doctor is Foreign Key reference by Doctor Table

Id\_Patient is Foreign Key reference by Patient table

### Appointments

id	Data	Time	check	Id_clinic	Id_doctor
----	------	------	-------	-----------	-----------

Id is unique field refers to Identification number as Primary Key.

Id\_clinic is Foreign Key reference by clinic table

Id\_Doctor is Foreign Key reference by Doctor Table

## Booking

id	Id_ patient	Id_ Appointments
----	-------------	------------------

ID is unique field refers to Identification number as Primary Key.

Id\_ patient is Foreign Key reference by patient table

Id\_ Appointments is Foreign Key reference by Appointments table

### CONCLUSION

System facilitates the patients booking appointments with ease without having to come to the hospital and system works on saving time and effort.

The system reduces the use of papers that all processes are electronically and this reduce least burden on the patient to carry papers.

This system speeds up the work of both the doctor and pharmacist and the laboratory through the rapid communication among themselves

The system is easy to use through a graphical interface is easy to use.

We got the satisfaction from the customer and they are satisfied and friendly with the system through an easily interface.

### CONCLUSION AND FUTURE WORK

- Any system that has been developed can provide a wide range of functionality but might lack some.
- We would to make this system independent from other system to make update for product automatically.
- I would to add more features to the system.

## References

- Adel, A., & Abdullah, B. (2015). *A Comparison Between Three SDLC Models Waterfall*. IJCSI International Journal of Computer Science.
- answers. (n.d.). Retrieved from <http://www.answers.com>
- Lerdorf, R. (2000). *PHP Pocket Reference*. Beijing : O'Reilly Media.
- Mishra, A., & Deepty , D. (2013). *A Comparative Study of Different Software*. International Journal of Advance Research in.
- Nolan, G. (2016). *Agile Swift : Swift Programming Using Agile Tools and Techniques*. Apress.
- Ruparelia, N. B. (2010). *Software Development Lifecycle*. ACM SIGSOFT Software Engineering Notes.
- Russo, J. (2015). *Modern System Analysis And Design*.
- Sommerville, I. (2001). *Software Engineering*. Pearson.