

System analysis and design – Project

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Hospital Management System

By :

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| 1. Yahya Mohamed Mansour Hassan Hamza | 4. Mahmoud Saad Mohamed Ahmed Farhat |
| 2. Eslam Hany Elsayed Nabwy Zoghla | 5. Mahmoud Sameh Abdel Osman |
| 3. Mohamed Sabry Mahmoud Shehab Eldeen | 6. Mohamed Yahya Amin Ali |

Supervised by : Eng. Abdallah Mohamed

Instructors : Prof. Alaa Eldeen

Prof. Mona Arafa

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Abstract

Hospital Management System is an organized computerized system designed and programmed to deal with day to day operations and management of the hospital activities. The program can look after inpatients, doctors, nurses, workers, security and managers. This system can deal with all financial issues in the hospital and organize all their relations. It can also keep information about all hospital places, devices and furniture. The system can deal with all hospital services like pharmacy, restaurant, blood bank and organ bank and organize their relations with patients and doctors and financial issues. This system mainly made to increase the efficiency of employees and the productivity of the hospital through computerized all its transactions. It can also help in decision making by providing management members all information they need. This system also keep all patients records to serve the well in a good way.



1- Introduction

Hospitals are essential part of our lives, providing best medical facilities to people suffering from various ailments. It is necessary for hospitals to keep track of its day-to-day activities and records of its patients, doctors, management staff, nurses, and other workers serve in any place in the hospital.

With the rapid development of the information society, computer technology has been widely used in all walks of life and computer applications are more and more popular in health care field. Using computer applications in hospitals will increase its efficiency, manage all important data and will ease financial transactions.

The main aim of our project to provide a paper-less hospital up to 70% to 90% and help the owner to know any transaction done in the hospital and it can also help in decision making by providing all necessary information about the hospital.



2- Project overview

* Project name: *Hospital management system*

* Current problem: Keeping track of all activities and their records in hospital is very cumbersome and error prone. It also is very inefficient and time-consuming process observing the continuous increase in population and number of people visiting the hospital. Recording and maintaining all these records on paper is highly unreliable, inefficient, and make many errors. It is also not economically and technically feasible to maintain these records on paper by the old way.

2.1- Project description

We are building a large Hospital management system for a very large hospital with many resources and services. This hospital also has many workers in many levels. This system will deal with many people like doctors from different departments, pharmacist, managers from different management sections, workers work in different places in the hospital like restaurant and inventory and security standing on the gate of the hospital to record the attendance of all people in the hospital. The hospital also has a blood bank, pharmacy, organ bank and a restaurant to serve all people in



the hospital. The system also will record places, devices and furniture. The system will include an enhanced financial system to deal with all people and resources and different services the hospital introduce.

Now I will explain each module in the hospital management system and its role.

- Admin of the system:

This system will has some admins with many permissions that they can do anything in the system the want one of the most important role of them that they can add people to the system to any job they need like a doctor, manager...etc. Also they can add any resources to the hospital that they can inset new places and services.

- Doctors:

They an inserted to the system by the admin or Human Resource Management. The system will include many information about the doctors like national number, name, phone-number, date of birth, department, e-mail, address, nationality, sex, basic salary, total salary and job description. Pharmacists will be from doctors but from a pharm department. Doctors will supervise on blood bank and organ bank. The admin or the Human Resource Management will identify the doctor status and his permissions. Doctors is one of the most important persons in this system. Doctors will check patients or make surgeries to them. All doctors in the system will be assigned to



a particular place often by the receptionist. When the doctor check the patient or make a surgery he writes prescription in the system then the patient go to the pharmacy in the hospital and he find his medicine there and its price automatically added to his account.

Doctor departments:

This departments are inserted by the admin of the system only. Each department will has a head also the system should display the number of the doctors in each particular department. These departments will also have the pharmacy department, organ bank and blood bank.

Patients:

This system mainly made for patients because our system serve the hospital which made for patients. When the patient enter the hospital the receptionist insert his name and other necessary data in the system. Also the receptionist assign a doctor and a place to the patient. The patient can book a surgery room and external doctor can make the surgery for him. Also when the patient come to the hospital the receptionist should identify his status to serve him well. If the patient buy anything in the hospital the price of this thing will automatically added to his account. The patient in the hospital can take his medicine from the pharmacy and he can eat in the hospital restaurant. If he made a surgery and wanted blood or a specific



organ he can find it in the hospital and its price will be inserted to his account.

Nurses:

They are inserted to the system by Human Resource Management. The system stores many information about them like name, national number, e-mail address, phone number, basic salary, date of birth, total salary, Job description, nationality and sex. They help doctors in their job and take care of patients.

Security officer:

A hospital security officer, he protects staff, patients, and visitors, ensure that personal identity for those entering and leaving the hospital and ensure that all hospital property is secure. His duties are to patrol the building and its grounds, monitor all activity in and out of the hospital, and endeavor to prevent vandalism, theft, fire, and disturbances within the facility. They frequently report to their manager or other security personnel about what you have observed on your rounds. They must be on the lookout for all sorts of issues at the hospital, including maintenance issues, which may compromise people's safety or the integrity of the building. Security officers are inserted to the system by the Human Resource Management. They use the system to record the attendance of the employee, doctors, managers, nurses and they also keep some information about other people who enter the hospital for another services like visiting



patient or some internships to serve the society...etc. The system store many information about them like name, national number, e-mail address, phone number, basic salary, date of birth , total salary, Job description, nationality and sex. The system also can assign a place or a region for each security officer to be protected. Any other necessary data of the security will be recorded in the system database.

Workers:

They are the people working in the hospital and providing other important roles that they are serving in the restaurant and they are responsible of cleaning the hospital places they also dealing with the inventory of Hygiene and sterilization tools. The system store many information about them like name, national number, e-mail address, phone number, basic salary, date of birth , total salary, Job description, nationality and sex. They are inserted to the system by Human Resource management.

Managers:

Managers will be inserted to the system by the admin of the system only. They have many roles in the hospital so they will be classified into types. The system will record many data about them like name, national number, phone number, e-mail, sex, nationality, job description, department, basic salary, total salary and any necessary data for them.



Management departments:

Every department will have a head from its member. The system also will display the number of the managers in each department.

1. Financial Management

It's the most important department in this field. It can export money to all employees in the hospital like doctors, nurses, workers...etc. It also can import money mainly from patients and also from donations and company make associations with the hospital to treat her employees.

2. Human Resource Management

This department is responsible for employ doctors, nurses, security officers and workers.

3. Purchase management

This section is concerned in buying anything in the hospital and inserting it to the system.

4. Marketing Management

5. Reception

It will be also a department and his member will be concerned in inserting patients to the system as we mentioned before.

6. Information Technology Management



This department will monitor the system and other modern technologies in the hospital one of the can be in system admins.

Places:

This part of the system content a

1. Category of this places (emergency - Administration - pharmacy - restaurant - rays – parking – surgeries – reception - Staff offices).
2. Each place has a unique id to distinguish each place from the other, easy to manage each place, a custom name for easy and quick management of these places, these places are full or empty, which is available to receive other patients or not.
3. Places are inserted to the system by admin or purchase management.

Devices:

This part of the system content a:

1. Category of this devices (Endoscopy – Gastroscopy – Laparoscopy – Bronchoscopy – Radiation equipment - Ultra sound equipment - nuclear medicine equipment for diagnosis - Gamma scanner - Gamma camera - Computer tomography - Biomedical Instrumentation - reaction measurement - pressure measurement - flow measurement -etc.).

We must recognize the number of devices.

2. Each device has a unique id to distinguish each device from the other, know if one device is damage and decided to make alarm to maintenance managers, a custom name.

Each device belongs to a specific place or section

The link is done by id between the device and the place to make it easier to locate the faulty or damage device.



3. Devices are inserted to the system by purchase management.

Furniture:

This part of the system content a:

1. Category of furniture (bed, chair, wheelchair, offices, etc...)
2. Each furniture has a unique id to distinguish each one from the other, know if one of them are damaged and want to be replaced or maintained.
Each furniture belongs to a specific place or section
3. Also the system should display the number of each type.
4. Furniture are inserted to the system by purchase management.

Blood Bank:

This field in the system will contain blood type, blood quantity and some information about it like how to store it and who can take this type of blood and other necessary information doctors need to insert. Doctors will manage this section and they have all the permissions here.

Organ Bank:

This section in the system will be managed by doctors. This field include:

1. The nature of the organ (Artificial or natural)
2. Also it is include the type of it (heart, teeth, bone, joint, limbs...etc.).
3. Every organ in this bank has its specification and information about its storage and any necessary details for it.



Restaurant:

This restaurant will serve food to patients in the hospital. The workers will deal with this system. This section will include the price and the quantity and the type for all food and drinks the restaurant serve. If any of the people buy any food and drinks the price will automatically will added to his account.

Pharmacy:

This system worked as follow:

Doctor that write a prescription and take an id of patient then, doctor send a prescription to pharmacist, when patient goes down he found a prescription already exists with pharmacist.

This system has the correctness if the patient wants to return something or replace something else.



2.2- Project scope

Project Includes

Project plan.

Business requirements specification.

User manual.

Login module which indicates which subsystem will be used according to the user and his responsibilities.

Receptionist system to add patients to the system with all necessary information.

Security module to keep the attendance of all employees in the hospital. Also they will record all visits to the hospital with the visit reason.

Blood bank system which receive, store, supply blood to patients in the hospital.

Organ bank System which has the capability for store organs and all necessary data about it in the hospital. It serves patients who need artificial or natural organs.

Pharmacy system to serve patient in the hospital.

Restaurant system which store and sell food and drinks to the patients in the hospital.

Admin module which can insert employee to the system and has more access and modification to the database.

Financial system which can import and export money to the system by many ways.

Human resource system which is responsible for employ people in the hospital and add them to the system with their data.

Purchase system which interested in adding and process places,



devices and furniture which exist in the hospital.

Doctor module which concerned in monitor patients and their records and write the prescription to them and the personification and other requirements.

Project Excludes

Laboratory management system.

Inventory system to monitor hygiene and sterilization materials.

Analysis system to the patients.



2.3- Assumptions

Assumptions

The resources identified will be available upon request.

All project participants will Abide by the guidelines identified within the plan.

Sponsors will be able to afford cost of the system.

All project must be finished within the stated time.

Only the admin of the system can delete records.

The hospital must have a good network infrastructure to run the system smoothly so it should have devices like switches and routers. It should also have a network engineer to maintain a good connectivity.

Providing database management systems (DBMS) for the hospital because it provide a proper system for storing, organizing, and managing critical health data such as finances, billing and payments, patient identification, and more. This information must remain confidential to the public, but easily accessible for the healthcare professionals who use this data to save lives.

There must be a good servers for running the system and store data efficiently.

The system should have a storage devices for backup and data



recovery like DAS (Directed attached storage) and NAS (Network attached storage).

The system and its database can be integrated with some office programs and make additional tasks with it.

The system can use printers and faxes also.



2.4- Constraints

Constraints

Time.

Cost.

This system is real time transaction so it requires access to online database.

A relational database will be used to implement this system and it will be considered in the chosen server and database management system.

The system must be able to run on different operating systems.

Failure rate must be low and if failure occurs recovery must be quick and accurate.

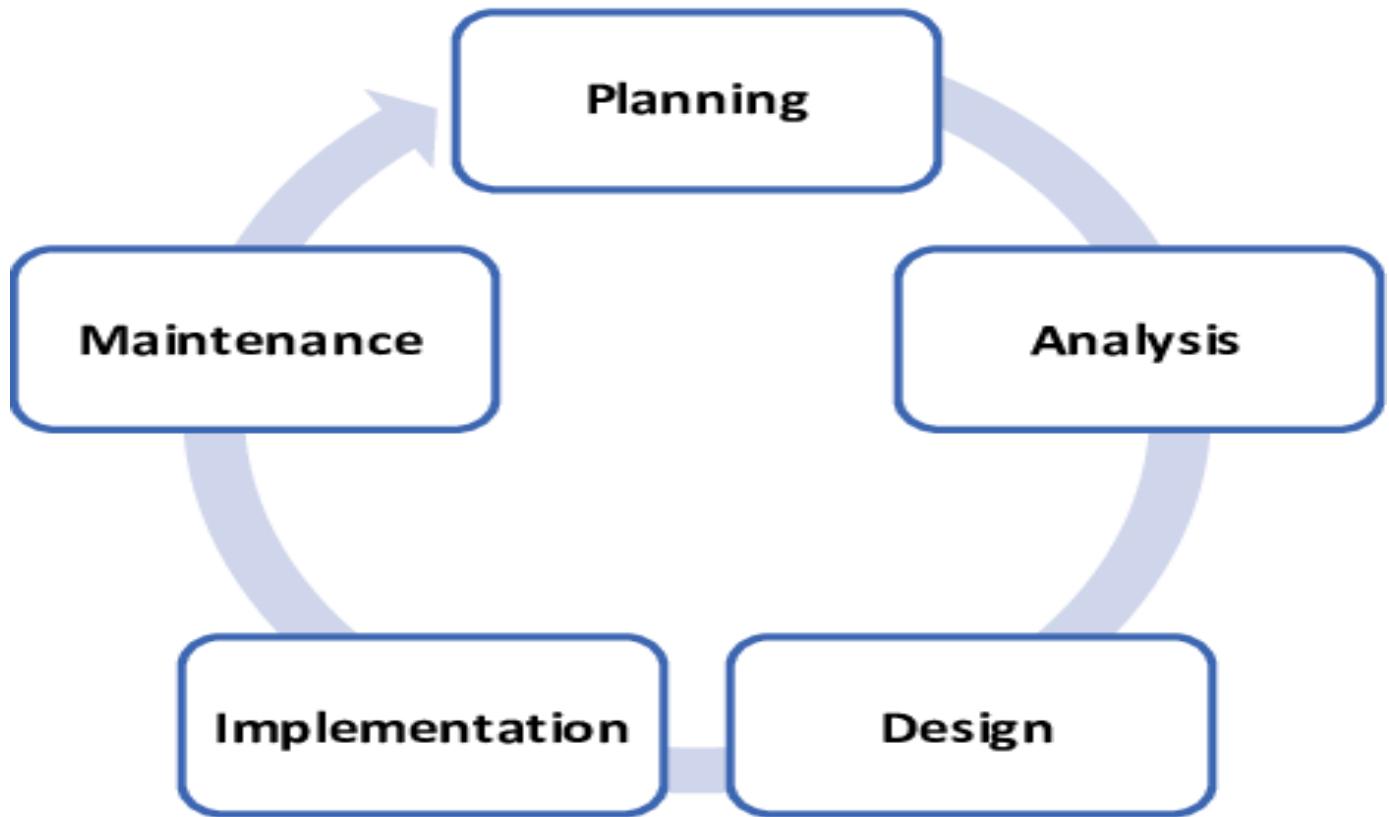
Turnaround time from transaction input to the production output must be a few seconds or less.

Every transaction must be processed in the same way regardless of user or time.



3- Project start-up

3.1- Project life cycle



phase	activities
planning	<ul style="list-style-type: none"> 1. Interview with the client. 2. Produced details project schedule consider network diagram. 3. Determine staff of project.
analysis	<ul style="list-style-type: none"> 1- Define system requirement. 2- Confirm project feasibility. 3- Review recommendation with team.

Design	1- Entity relationship diagram (Erd). 2- Dataflow diagram. 3- Database. 4- Graphic user interface (Gui).
Implementation	1- Verify and test. 2- Train the users. 3- Install the system.
Maintenance	After system installation the system should be monitored and maintained every period of time to check if it has any problems or the system need updates.

Phase 1: planning

In this phase the schedule of project determined, number of tasks and the time that will be needed to finish the tasks.

And consists of two main activities

1-identification of need for a new or enhanced system.

2-investigation and determination of scope.

Network diagram

We divide project into 14 tasks and give time to each task and illustrate how each task depend on another task using network diagram ,calculate earliest time, latest time ,calculate slack time and critical path.



Gantt diagram

A graphical representation of a project that shows each task as a horizontal bar whose length is proportional to its time for completion. We illustrate how tasks represent on Gantt chart and we use Microsoft project.

Phase 2: Analysis

- In this phase,
- One or more system analysts work with different stakeholders
- Groups to specific requirements for the new system.
- No programming is done in this phase.
- And in this phase illustrate the one-time cost of the project, recurring cost, benefits and decide if we keep going in the project, we calculate which year will begin to earn money from organization, calculate break-even point, we calculate present and net present value and suppose discount rate 12%

Phase 3: design

- in this phase the business requirement are translated into specific technical requirements.
- the design for the user interface, database, data inputs and outputs, and reporting are developed here.
- the result of this phase is a system-design document.



ERD:

An entity relationship Diagram is a type of flowchart that illustrates how entities such as people, objects or concepts relate to each other within a system .Er Diagrams are most often used to design or debug relational database in the fields of software engineering.

We use the rules to represent erd , divide hospital to patient that everything do in hospital add to your record and managers that manage hospital ,nurses ,workers ,security and link patient with place to know place for each patient , illustrate restaurant and how to deal with patient and pharmacy how to deal with patienteach entity represent in rectangle shape ,attribute represent in cycle ship and relation represent in rhombus

Data flow diagram

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination. Data flowcharts can range from simple, even hand-drawn process overviews, to in-depth, multi-level DFDs that dig progressively deeper into how the data is handled. We divide project into modules to become easy to represent DFD we divided into managers, restaurant, security and doctors

We perform 2levels in each module (context, level 0, level 1) and illustrate what the relation, dependences each one to another, we use check box to check person exist the system or not and managers may be HR or receptionist or purchase or financial and security take attends from any person that enter to the hospital ,receptionist add



patients to the system ,financial system which can import and export money to the system and purchase system which interested in adding and process places ,devices and furniture which exist in hospital.



4- Risk management

Risk description	probability	impact	strategy
Cost estimates unrealistic	low	high	1-Find more cost-effective solutions 2-find a partner 3-find finance websites ex : Zoomaal , kickstarter 4-Reduce requirements
Time estimates unrealistic	Medium	High	1-reduce requirements 2-find a freelancer developer 3-Enable working overtime
Team size	low	low	1-search for new developers that have self-discipline 2-find a freelancer developer 3-divide tasks on available members temporary
Team members Unknowledgeable Of business	low	high	1-provide business courses for team members 2-increase awareness of business problems
Narrow knowledge Level of users	medium	Low	1-Increase training duration



5- Collecting system requirements

5.1- Interview questions

Question number	Question	Answer
1	What is the role of the security in the hospital?	A hospital security officer, he protect staff, patients, and visitors ,ensure that personal identity for those entering and leaving the hospital and ensure that all hospital property is secure. his duties are to patrol the building and its grounds, monitor all activity in and out of the hospital, and endeavor to prevent vandalism, theft, fire, and disturbances within the facility. You frequently report to your manager or other security personnel about what you have observed on your rounds. You must be on the lookout for all sorts of issues at the hospital, including maintenance issues, which may compromise people's safety or the integrity of the building.
2	How the security will	They use the system to record the attendance



	use the system?	of the employee, doctors, managers, nurses and they also keep some information about other people who enter the hospital for another services like visiting patient or some internships to serve the society...etc.
3	How the receptionist work in the hospital?	He is responsible for entering the patient to the hospital system. He identifies the status of the patient then he choose a doctor to treat the patient according to the patient problem and his status and also the available spaces in the hospital. He should confirms that if the doctor exist or not according to the attendance of them.
4	Who would you like to insert employees to the system?	Human resource management concerned in this field.
5	Can you classify employees in the hospital?	Sure, mainly we have five type of employees: doctors, nurses, security, workers and managers.
6	Do you want all of them to have access to the system?	No, because there will be no use to the system for part of them.
7	How the financial department work?	They are concerned in all financial matters. This system indicate the status of all money in the system. It can also import and export money to the system by different methods.



8	What about the Purchase management system?	This system is insert things owned by the hospital like the furniture and places and devices and another things.
9	How the pharmacy work in the hospital?	It serves patients in the hospital only. It has the correctness if the patient wants to return something or replace something else. The Prescription is written by the doctor from the hospital then the patient take the medicine from the pharmacy and the cost added to his account.
10	What is the role of the blood and organ bank in the system?	They serve hospital patients only. Doctors will use this field in the system and they will only specialized in this in the system.
11	How the restaurant working in the hospital?	In the restaurant there are categories for food and it can serve drinks. In the beginning of the system we want the restaurant to serve patients only.
12	Do you want to keep records and history of the patients?	Yes, because in the future we can make an analysis system to help in many fields. Keeping records of the patients will be also help in decision making process.
13	What data do you want the system keep of the patients?	Name Status Birth Date Gender National number Phone number Email address Entering and leaving dates



		Personification and requirements in every time All financial issues
14	Is the places of employees fixed or may be changed?	Only doctors and nurses change their location. Other employees in the hospital work in fixed location.
15	Who has departments in the hospital?	Managers and doctors only.
16	How can you differentiate other employees in the hospital who didn't have department?	We differentiate them by their locations.
17	What data do you expect the system will store about the employees?	Name National number Phone number Address Email Joining date Birth date Job description Gender And the system should maintain a good way to organize all their financial matter.
18	Do you want the system to have an admin to have	Yes, It's very necessary.



	additional roles and help in inserting people?	
19	In your opinion, How can users access to the system?	We want them access to the system using their ID and their national number.

5.2- Interview report

This system will contain 12 modules to ease its use and increase its performance and they will be as follow:

1. Login module:

In this module system user firstly will identify his role in the hospital (doctor, manager, security or worker), then he will use his id which is produced automatically from the system and also his national number. If the member exist in the system he will use the system smoothly according to his role else the system should produce a warning message and identify the error and let him try to access the system again. The system give the user only three tries in 30 seconds then it will block the user for ten minutes.

2. Doctor module:

The doctor can see all patients inserted to him in his working time according to entering and leaving time. When the doctor check the patient he can see all his records in the hospital. After checking patients the doctor writes personification and requirements and save it



to patient records to be checked in the next time. Finally the doctor gives the patient a report with his status and requirements and writes prescription to him to be used in pharmacy module.

3. Pharmacy module:

Pharmacist will deal with this module. Firstly they check the patient prescription and give them the medicine and report with the details of medicines and their price. This system has the correctness if the patient wants to return something or replace something else so it must save all data. Pharmacists can see all patients in the hospital and when they coming to them they only choose his name and check what he want.

4. Organ bank module:

Doctors from organ bank department will deal with this module. They will have all the permissions to monitor and modify all organ data. They can give the patient the needed organ according to his record and his requirements and the availability of needed organ then the price of the organ can be paid here or added automatically to patient record.

5. Blood bank module:

Doctors from blood bank department will deal with this module. They will have all the permissions to monitor and modify all blood data. They can give the patient the needed blood according to his record and his requirements then the price of the blood can be paid here or added automatically to patient record.



6. Security module:

Security working between gates will have the permission to work with this module. This module concerned in record attendance for all hospital employees and other visitors. First the security officer check the person who coming the hospital and classify him according to system database then he will choose appropriate place to insert his attendance and departure. Note that the place of the doctors and nurses can change so the place they will work in will be added in this phase. An attendance report can be generated in this module for management members to provide them with all needed information.

7. Restaurant module:

Workers from restaurant place can access this module and use it smoothly. This module now will serve patients only but in the future it can serve all people exist in the hospital so the system should have the capability for future enhancement. Patient can make orders with the help of workers through this module. First it check the availability food and put it in the patient order then the cost of the order can be taken here or added automatically to patient record. Restaurant workers can monitor and modify all food in the system. This module should have the capability of generating food receipts for patients with all order detail.

8. Receptionist module:

Employees from receptionist department will have the capability to deal with this module. They are dealing with patients when



entering the hospital. If the patient came to the hospital before the receptionist will only make a new record for him else the receptionist will add the patient to the system and make a record for him. In patient record entering and leaving times should be inserted and the patient doctor and the patient place. The receptionist add doctors to patients according to their attendance and also the patient status identified in this phase.

9. Purchase module:

Employees from purchase department will deal with this module. They have the capability for monitoring and modify all places and devices and furniture data.

10. Financial module:

This the most important module in the system. Employees from financial department will have the permission to deal with this module. They can monitor and modify all financial data in the system and assign them to hospital employees and patients and others. This system has the capability to import money from patients and other companies an export money to hospital employees. This module can generate financial reports indicate all financial matters for management members.

11. Human resource module:

Employees from human resource department will use this module. They can monitor and modify all employees' data (doctors, nurses, security, workers and managers). This module should have the



capability to generate reports with all information about employees in the hospital to management members.

12. Admin module

The system can have more than one admin. They will have all permissions in the system and do anything they want according to system capability which discussed before. They can add managers and their department in the system to ease of system using.

Data will be kept in the system:

Descriptive name	Data
Employees (doctors, nurses, security, managers and workers)	ID Name Phone number National number Address(street, city, Governorate) Email address Joining date Birth date Gender Job description Total salary Place which the work in Attendance(entering and leaving) Department if exist



Financial issues	
Patients	<ul style="list-style-type: none"> -ID -Name -Birth date -National number -Gender -Phone -Email -Patient records(Entering and leaving time, personification, requirements, total cost, prescription which contains medicines and all financial issues)
Places	<ul style="list-style-type: none"> -ID -Name -Description -Category -Status -The system should also store the number of each category
Devices	<ul style="list-style-type: none"> -ID -Name -Description -Category -Its place -The system should also store the number of each category
Furniture	<ul style="list-style-type: none"> -ID -Name -Description -Category



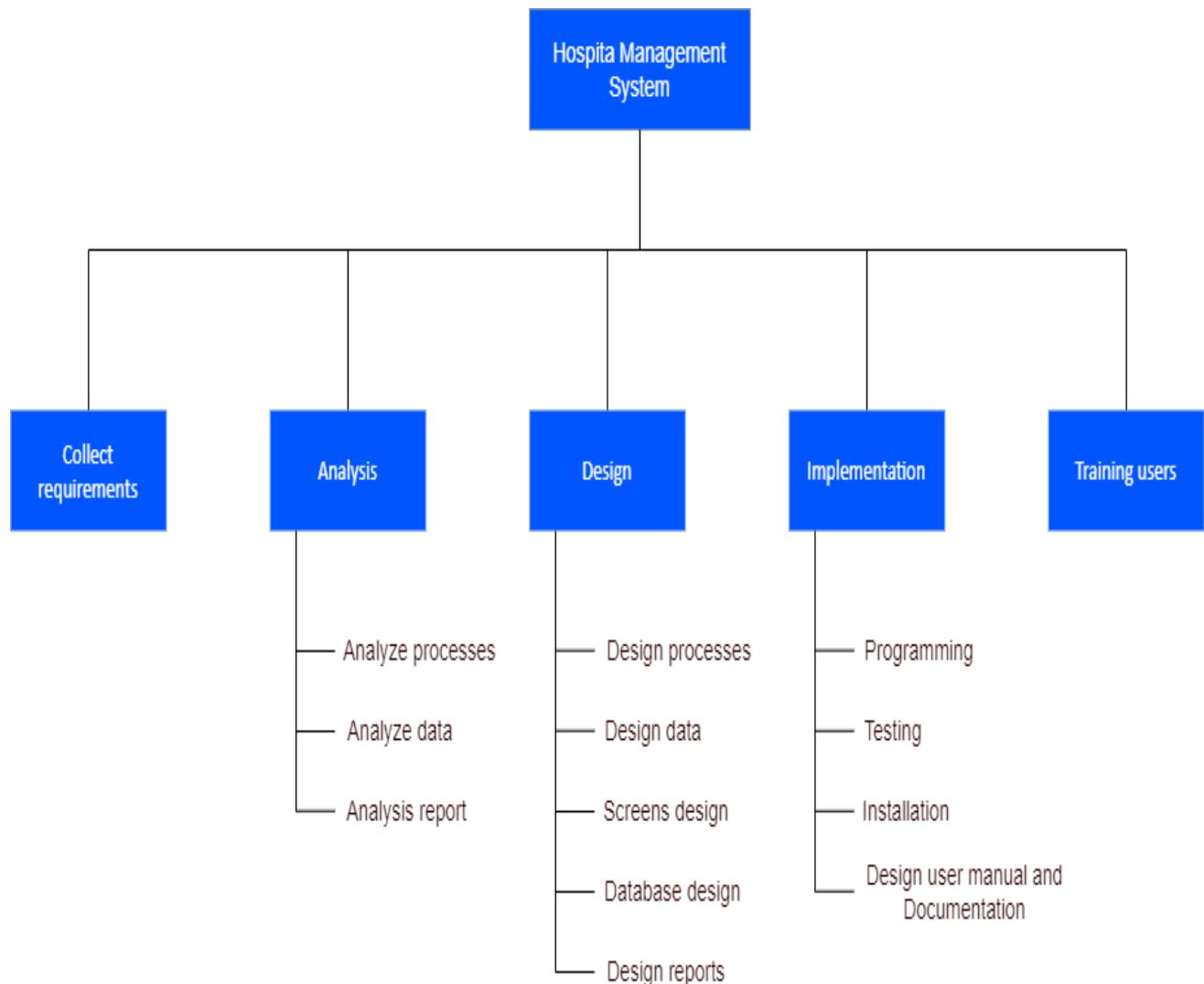
	<ul style="list-style-type: none"> -Status -Its place -The system should also store the number of each category
Medicines	<ul style="list-style-type: none"> -ID -Name -Product date -Expire date -Quantity -Price -The manufacturer company
Prescription	<ul style="list-style-type: none"> -Patient id -medicines ID -Total price -Date
Organs	<ul style="list-style-type: none"> -ID -Name -Description -Price -Category -Organ nature -The system should also display the number of organs from each category.
Blood	<ul style="list-style-type: none"> -ID -Blood type -Quantity -Price
Blood order	<ul style="list-style-type: none"> -Patient ID -Blood ID -Quantity -Price (automatically calculated)
Food	<ul style="list-style-type: none"> -ID -Name -Quantity -Expire date -Description



	<ul style="list-style-type: none"> -Price -Category
Food order	<ul style="list-style-type: none"> -Patient id -Food id -Order date -Total price
Financial	<ul style="list-style-type: none"> -ID -Name -Description -Value -Status
Others for financial	<ul style="list-style-type: none"> -ID -Name -Description -Phone -Email
Financial issues	<ul style="list-style-type: none"> -Financial id -ID (for the benefiter) -Date
Admin	<ul style="list-style-type: none"> -ID -Name -National number -Phone number -Email address -Description

6- Work breakdown structure

In this phase the project is divided into manageable tasks and then we will use this division to logically order them to ensure a smooth evolution between tasks. Some of these tasks may be performed in parallel, whereas others must follow one another sequentially. All tasks are shown in the next figure.



We used “draw.io” software to make this figure.

7- Pert equation

Task number	Task	o	r	p	ET
1	Collect requirements	3	4	6	4
2	Analyze processes	5	7	9	7
3	Analyze data	2	3	5	3
4	Analysis report	1	2	4	2
5	Design processes	3	5	7	5
6	Design data	2	4	5	4
7	Screens design	4	7	10	7
8	Database design	3	4	6	4
9	Design reports	2	3	4	3
10	Programming	7	9	13	10
11	Testing	2	5	7	5
12	Design user manual and documentation	2	3	4	3
13	Installation	1	3	5	3
14	Training users	1	2	4	2

Note that: the time in the table is in weeks.

o: is abbreviation for optimistic time.

p: is abbreviation for pessimistic time.

r: is abbreviation for Realistic time.

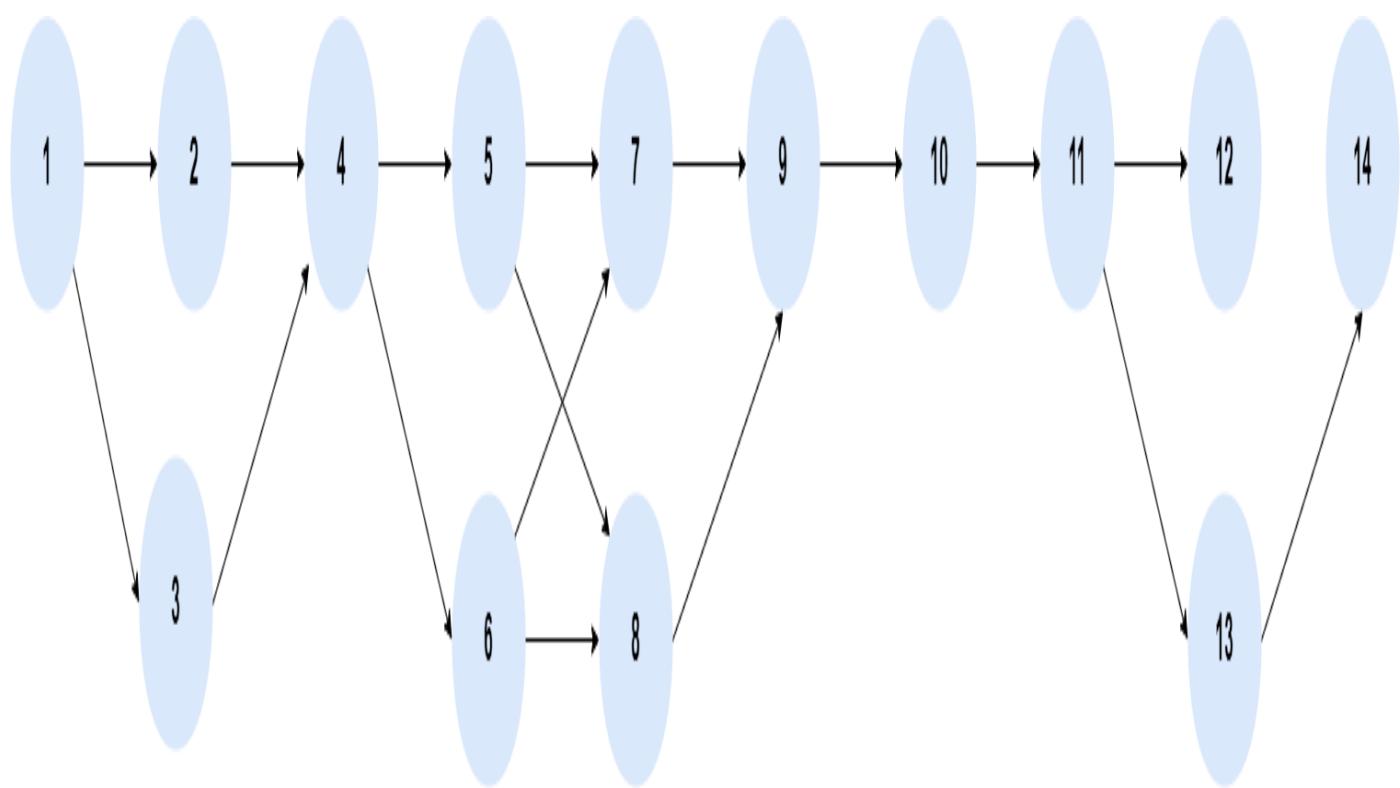
ET: is abbreviation for expected time.

We use this formula to calculate its value.



8- Network diagram

Task number	Task	Time(weeks)	Immediate predecessors
1	Collect requirements	4	-
2	Analyze processes	7	1
3	Analyze data	3	1
4	Analysis report	2	2,3
5	Design processes	5	4
6	Design data	4	4
7	Screens design	7	5,6
8	Database design	4	5,6
9	Design reports	3	7,8
10	Programming	10	9
11	Testing	5	10
12	Design user manual and documentation	3	11
13	Installation	3	11
14	Training users	2	13

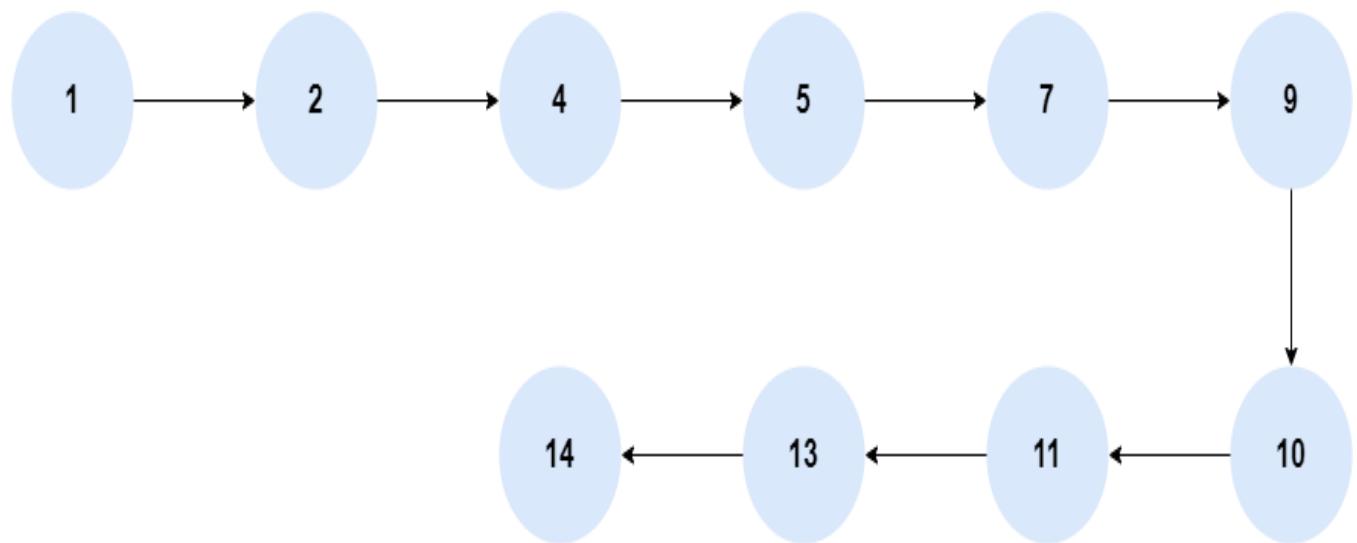


We used “draw.io” software to make this figure.

9- Critical path

A scheduling technique whose order and duration of a sequence of task activities directly affects the completion data of a project and the shortest time in which a project can be completed.

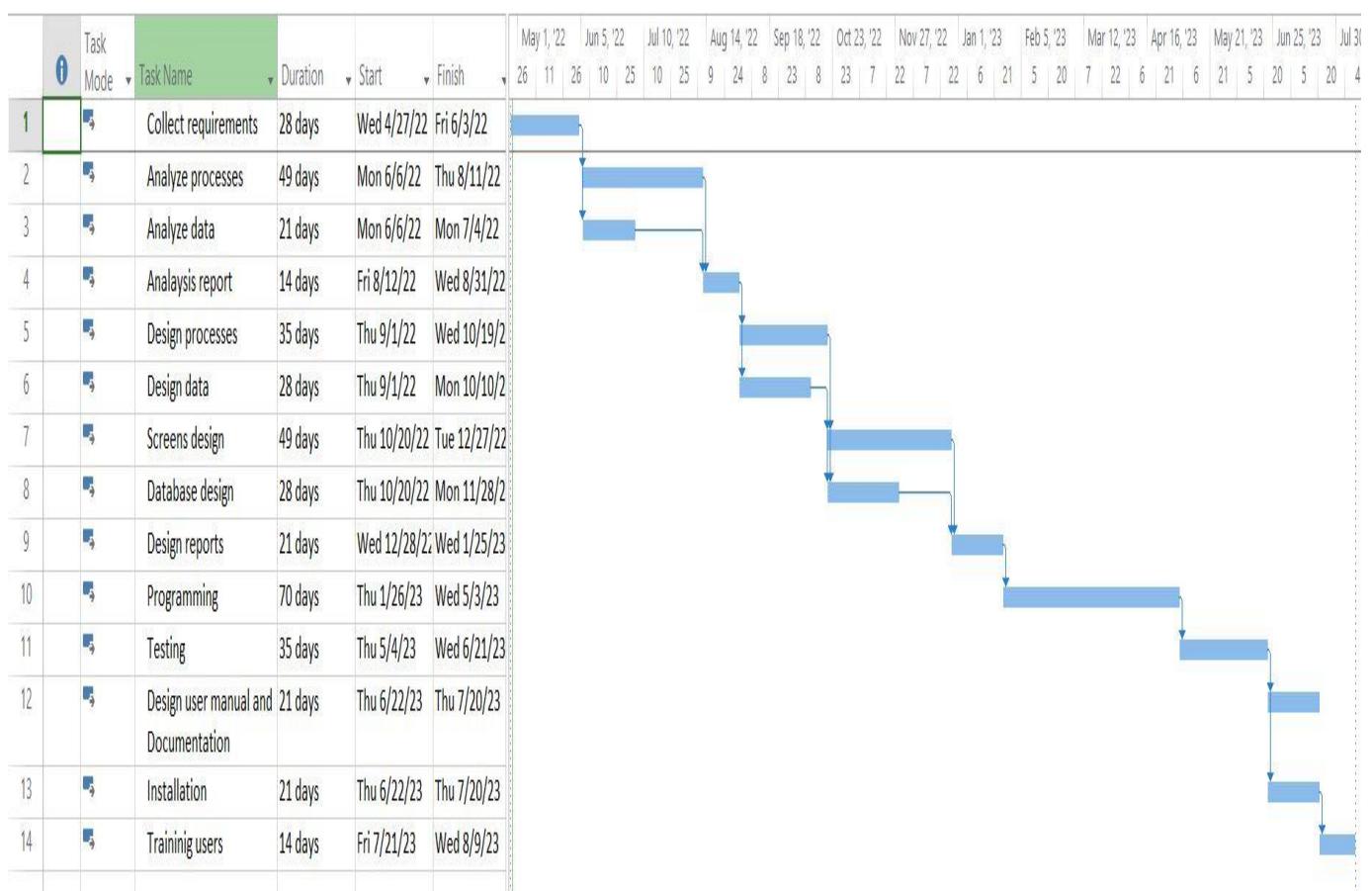
Activity	TL	TE	Slack(TL-TE)	ON Critical
1	4	4	0	true
2	11	11	0	true
3	11	7	4	false
4	13	13	0	true
5	18	18	0	true
6	18	17	1	false
7	25	25	0	true
8	25	22	3	false
9	28	28	0	true
10	38	38	0	true
11	43	43	0	true
12	48	46	2	false
13	46	46	0	true
14	48	48	0	true



We used “draw.io” software to make this figure.

10- Gantt chart

A graphical representation of a project that shows each task as a horizontal bar whose length is proportional to its time for completion. Gantt charts do not show how tasks must be ordered (precedence) but simply show when an activity should begin and end. The next figure will show the gantt chart for the project.



We used “Microsoft project” software to make this figure.

11- Feasibility study

11.1- Economic feasibility

	Years							Total
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
Net economic benefit	0 \$	120,000 \$	120,000 \$	120,000 \$	120,000 \$	120,000 \$	120,000 \$	
Discount Rate (12%)	1	0.8926	0.7972	0.7118	0.6355	0.5674	0.5066	
PV of benefits	0 \$	107,112 \$	95,664 \$	85,416 \$	76,260 \$	68,088 \$	60,792 \$	
NPV of all Benefits	0 \$	107,112 \$	202,776 \$	288,192 \$	364,452 \$	432,540 \$	493,332 \$	493,332 \$
One-time cost	80,000 \$							
Net economic cost	0 \$	50,000 \$	50,000 \$	50,000 \$	50,000 \$	50,000 \$	50,000 \$	
Discount Rate (12%)	1	0.8926	0.7972	0.7118	0.6355	0.5674	0.5066	
PV of cost	0 \$	44,630 \$	47,832 \$	39,860 \$	31,775 \$	28,370 \$	25,330 \$	
NPV of all cost	80,000 \$	124,630 \$	172,462 \$	212,322 \$	244,097 \$	304,242 \$	357,942 \$	357,942 \$
Yearly PV Cash Flow	80,000 \$	62,482 \$	47,832 \$	45,556 \$	44,485 \$	39,718 \$	35,462 \$	
Yearly NPV Cash Flow	80,000 \$	17,518 \$	30,314 \$	75,870 \$	120,355 \$	128,298 \$	135,390 \$	

Benefit per year = 120,000 \$

Recurring cost per year = 50,000 \$

Discount rate =%12

One time cost = 80,000 \$

Overall NPV = 135,390 \$

Overall ROI = 0.38

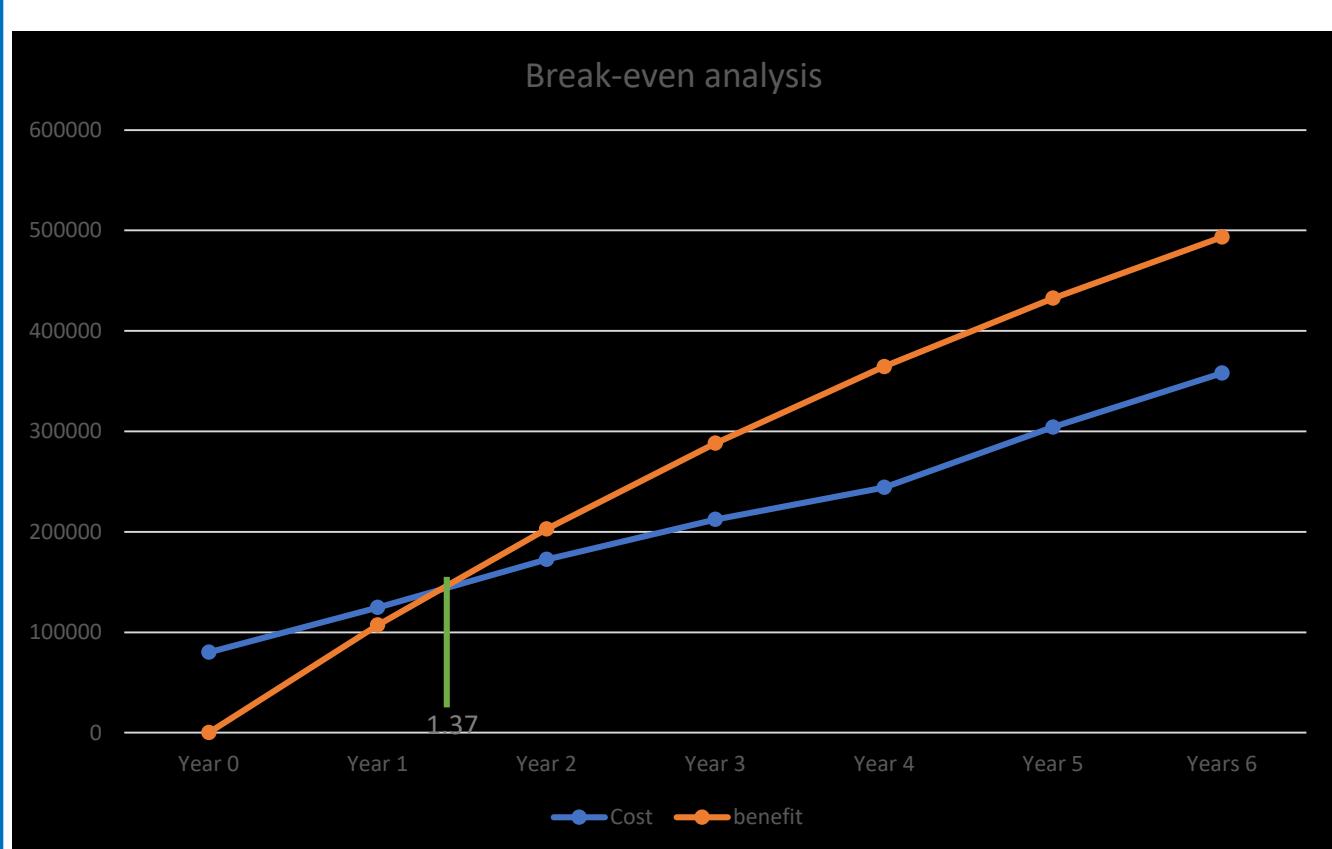
$$\text{Break-even point} = \frac{\text{Yearly PV Cash Flow} - \text{Yearly Overall NPV Cash Flow}}{\text{Yearly PV Cash Flow}} =$$

$$\frac{47,832 - 30,314}{47,832}$$

$$= 0.37$$

Actual break-even point occurred at 1.37 year





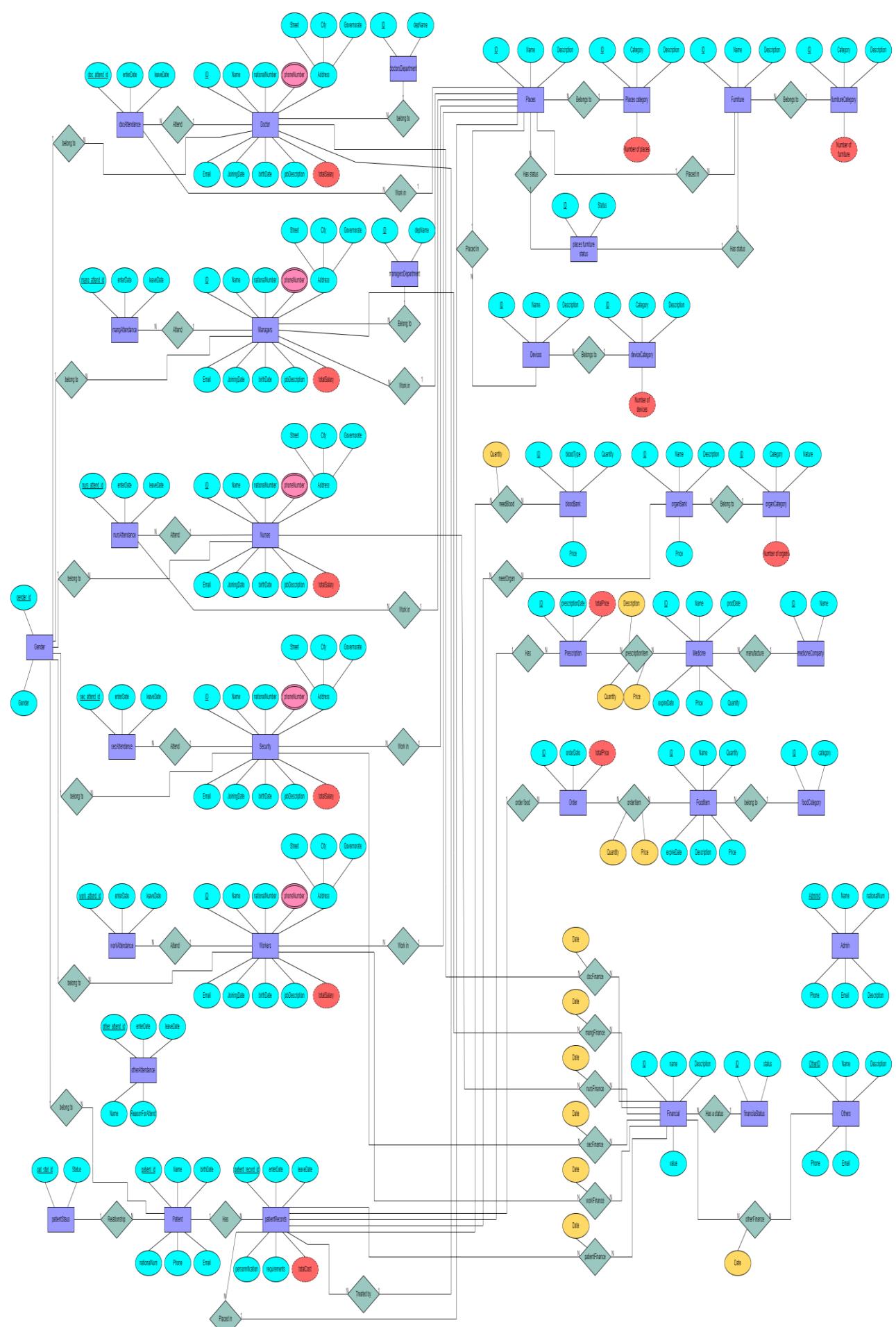
11.2- Operational feasibility

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system ,instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make constructive criticism, which is welcomed, as he is the final user of the system.

12- Data modeling

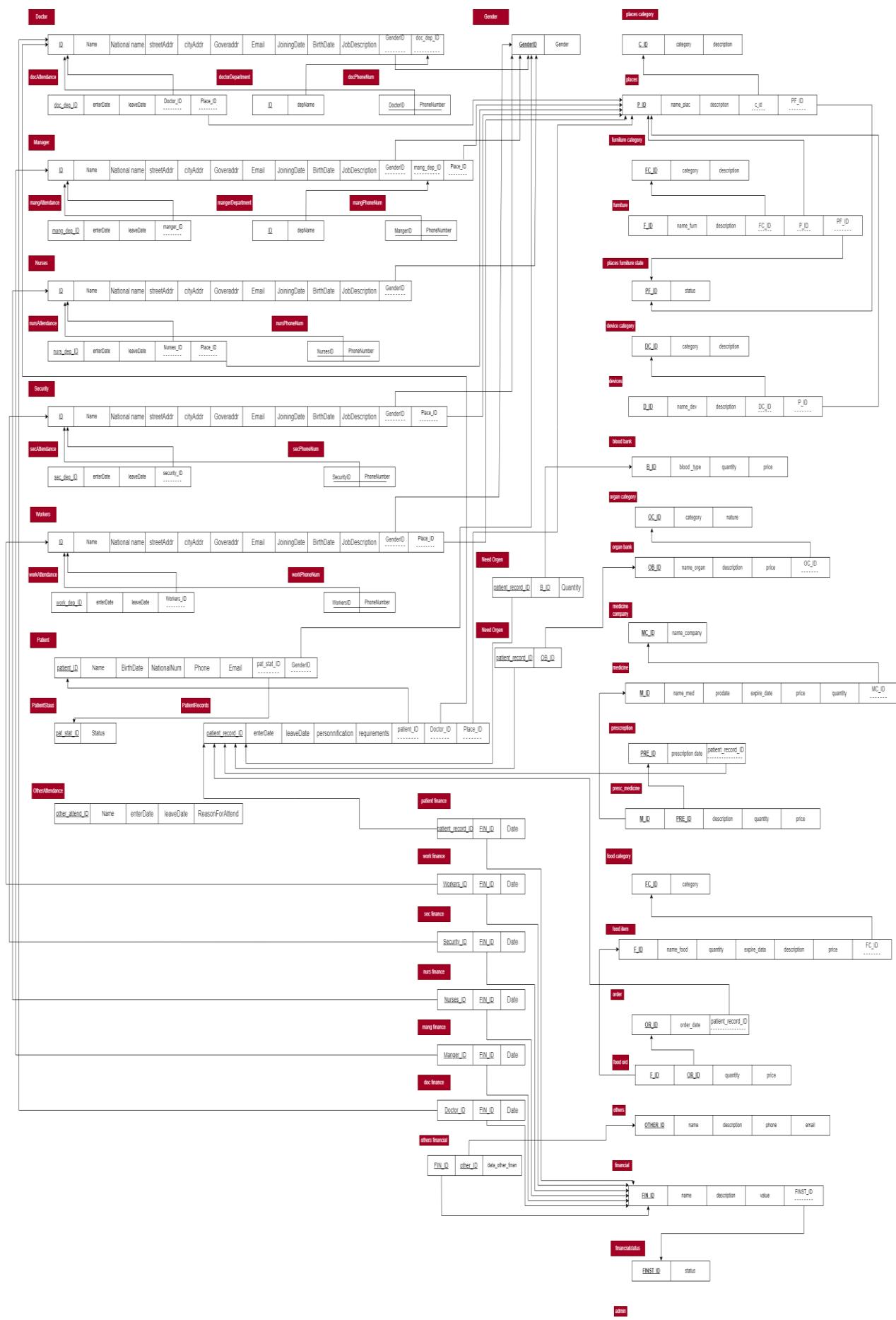
12.1- Entity Relationship Diagram





12.2- Mapping



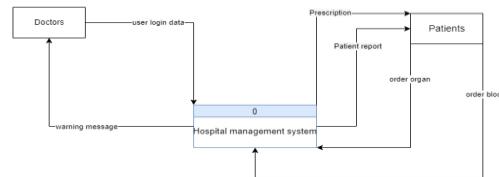


13- Data flow diagram

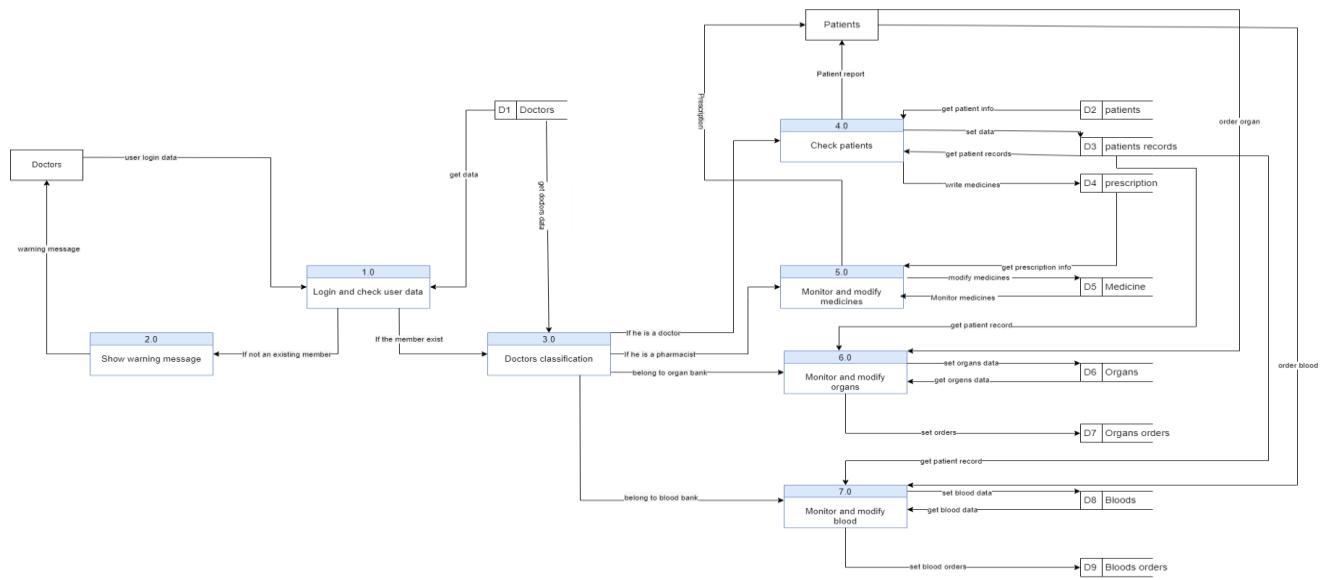
Doctors DFD



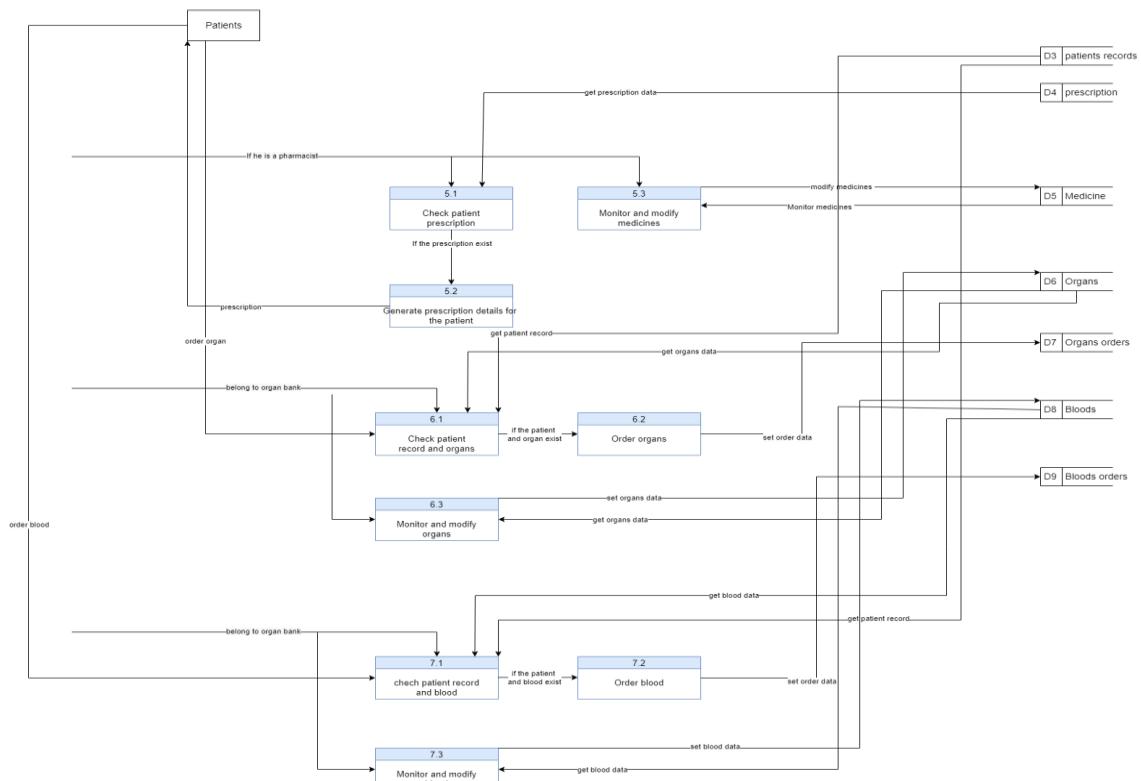
Context diagram



Level 0



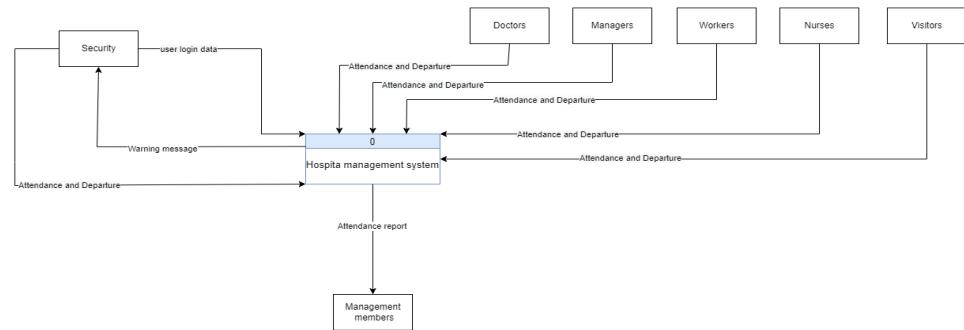
Level 1



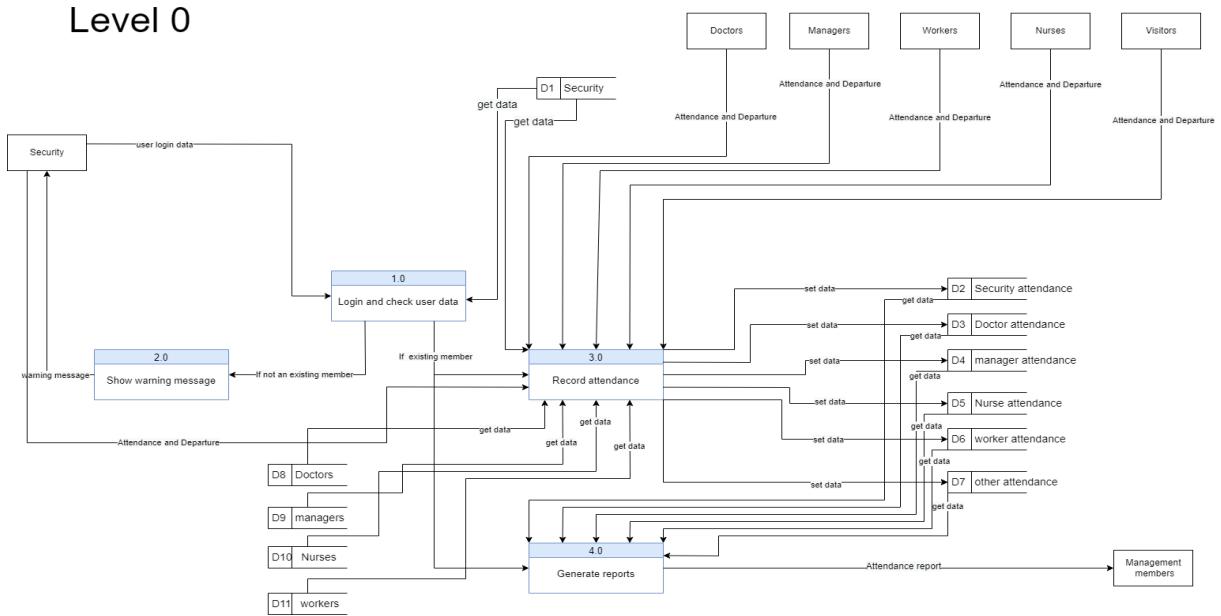
Security DFD



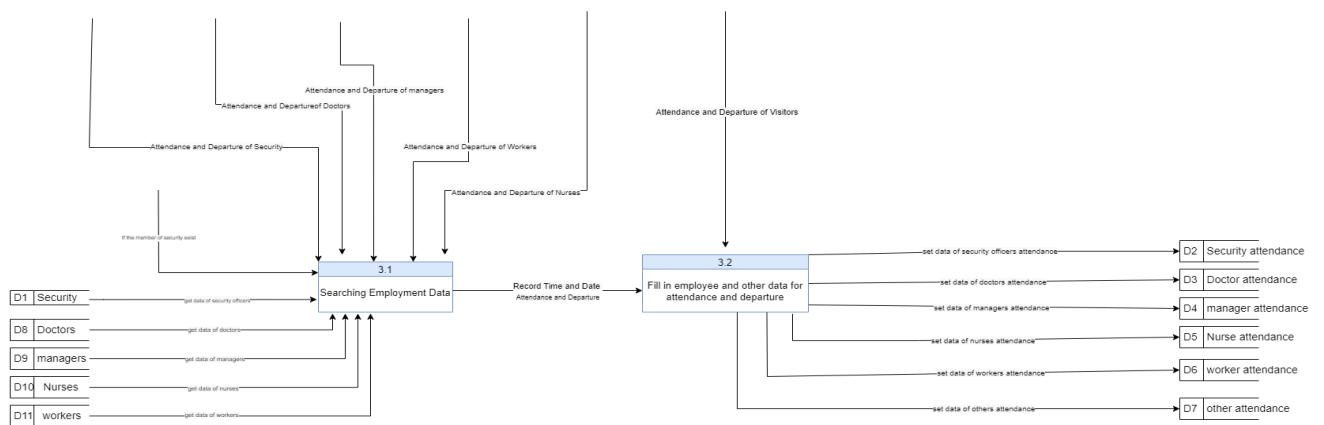
Context diagram



Level 0



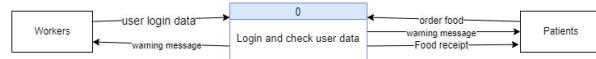
Level 1



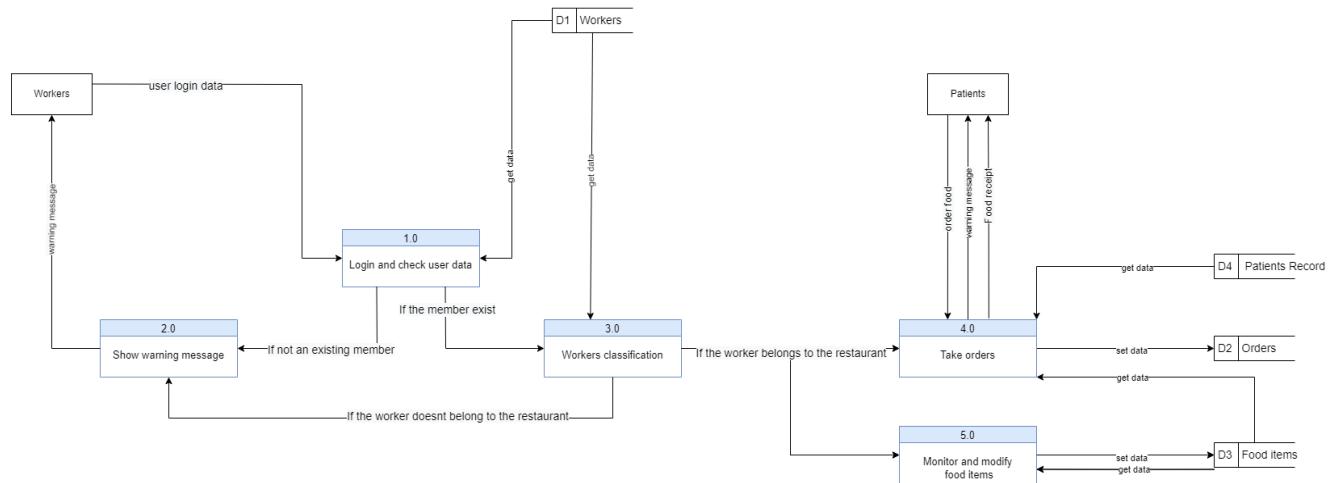
Restaurant DFD



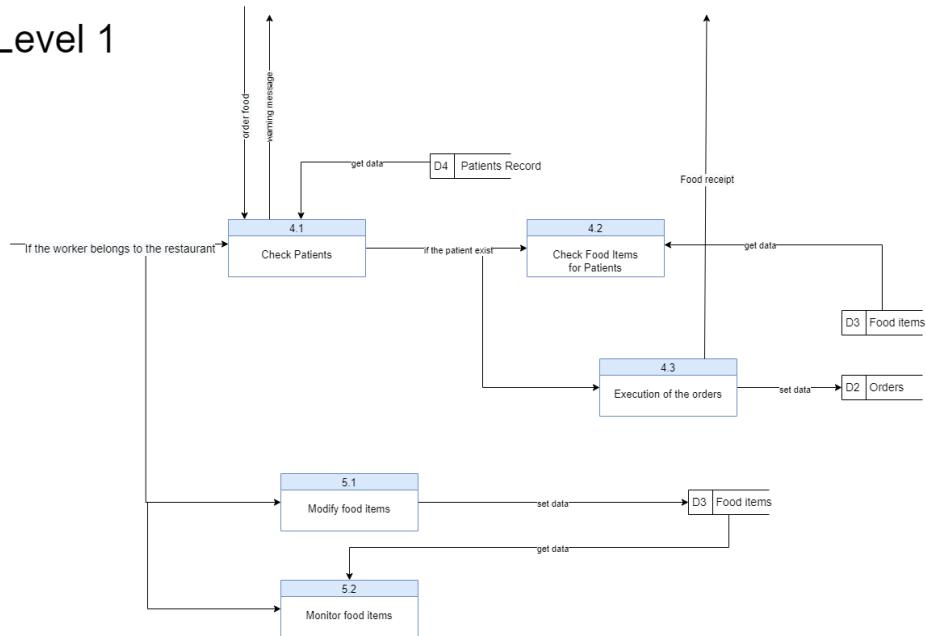
Context Level



Level 0



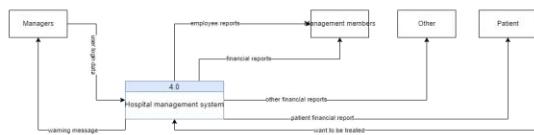
Level 1



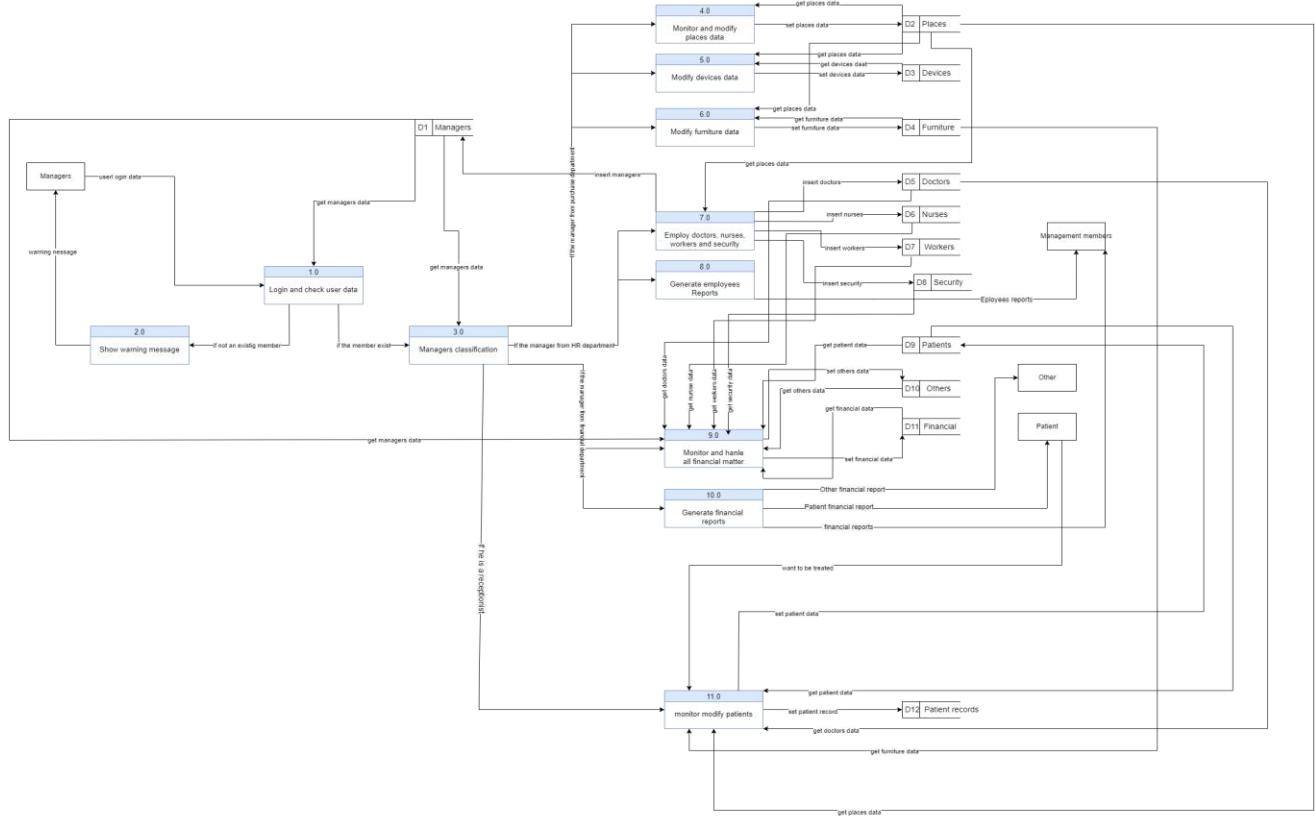
Managers DFD



Context diagram



Level 0



Level 1

