الجامعة السعودية الإلكترونية
SAUDI ELECTRONIC UNIVERSITY
2011-1432

College of Computing and Informatics

Systems Analysis and Design

IT243

Project Report

Deadline: Thursday 9/12/2021@ 23:59

[Total Mark for this Project is 10]

Student Details:

Name: **Batoul Zeyad Saeb Haj Khalil** **ID:** ---------

*** other team members names are hidden**

CRN: 10274

Instructions

- As a system analyst, you are requested to develop an Information System by performing the first three phases of SDLC (planning, analysis and design). You need to apply what you have learned in the class and to participate in the team project work.

- You have received a System Service Request (SSR) from a client and you need to apply the planning, analysis and design phases.

- In this project, the first step is to present the SSR received (select a scenario of your choice). Then, you need to prepare the main deliverables of the planning phase: Project Scope Statement (PSS) and the Baseline Project Plan (BPP).

Note that: all sections of these documents should be included (for example the system description, the feasibility assessment, and the management issues in the BPP).

- Finally, you need to start the analysis and designing steps by providing the Data Flow Diagram (DFD) and the Entity Relation Diagram (ERD) of the Information System to be developed.

Deliverables

This project should follow the main steps of the first three phases of the SDLC (phase 1, 2 and 3). Detailed description should be included in each phase.

Planning Phase

Learning Outcome(s):

CLO3: Recognize different concepts, principles, and software modelling techniques.

Under this section, include the following:

- **The System Service Request.** (1.5 marks)
- **The Project Scope Statement.** (1 mark)
- **The Baseline Project Plan.** (1.5 marks)

--*-*-*-*-*-*-*System Service Request*-*-*-*-*-*-*-*-*

REQUESTED BY: SBS hospital committees **DATE: March 1, 2020**

DEPARTMENT: Health Informatics **LOCATION: Headquarters, 1-223**

CONTACT: **Tel: 4-7622** **FAX: 4-0733** **E-mail: SBShospital@sbs.sa**

-TYPE OF REQUEST:

{ } New System.

{ **x** } System Enhancement.

{ } System Error Correction.

-URGENCY:

[ ] Immediate - Operations are impaired or opportunity lost.

[ ] Problems exist, but can be worked around.

[**x**] Business losses can be tolerated until a new system is installed.

-Problem Statement

SBS Hospital was a small hospital, yet it was remarkably successful. As a result of this big success, the hospital committees have decided to expand the hospital works. However, the hospital's legacy system, called “Cortex”, was not effective enough to handle the expected heavy workload and deliver the expected high-quality care that patients have always trusted us for. As well, the system is no longer supported as it has become vulnerable to regular malicious attack, and its tools have become outdated as it doesn't run along with the demanding advancement in technological and healthcare fields anymore. In addition, the user interface and experience is horrible that medical staff struggle with and waste their precious time and effort rather than focusing on the patient. As a result, tons of medical errors occur and cost the hospital millions yearly.

-Service Request

I request a thorough analysis of the hospital’s needs and the workflow to build an enhanced EHR with updated tools. Also, it should have a well-designed user-friendly interface and boost the user

experience. As well, it is crucial to have some kind of extensions that support the physician in evidence-based decision-making regarding the patient's condition.

IS LIAISON: Sara Rayhan (Tel: 3-7889 FAX: 3-2976 E-mail: Srayhan@sbs.sa).

SPONSOR: James White.

…… TO BE COMPLETED BY SYSTEMS PRIORITY BOARD……..……..…….

[**x**] Request approved

[ ] Recommend revision

[ ] Suggest user development

[ ] Reject for reason

Assigned to ---------Batoul Haj-Khalil---------- **Start date** -----09 December 2021---------

--*-*-*-*-*-*-*-*Project Scope Statement*-*-*-*-*-*-*-*-*-*

Project Name	**EPIC EHR System**		
Project Sponsor	James White	**Project Manager**	Batoul Haj-Khalil
Date of Project Approval	09 December2021	**Last Revision Date**	09 December2021

-Scope Description:

In scope:

- An EPIC system to deal with and develop patient records electronically.
- Preparing the EPIC system to be ready to deal with all the needs of the medical staff.
- Training the medical staff on how to use the system.
- A management system so that the EPIC system can be controlled by the health informatics staff.

Out of scope :

- Support for patients as a user for the system.

-Project Deliverables:

- A Full functional EPIC EHR system.
- A training manual for new and existing health staff.

-Acceptance Criteria:

The system will be accepted when the medical team agrees that the output meets their needs.The system will be considered successful if post-launch testing show that patient satisfaction is more than 8 out of 10 points or higher.

-Constraints:

The health staff is not dedicated to this system as it must fit into the day-to-day functions of the health staff.

-Assumptions:

- The Health staff and the project team will be available till the end of development of the EPIC System.
- Epic system will fit the hospital workflow almost perfectly.
- Epic system will be able to handle the heavy workload and manage all medical records.
- day-to-day operations costs will remain stable.

--*-*-*-*-*-*-*Baseline Project Plan*-*-*-*-*-*-*-*-*

-Introduction:

- **Project Overview:**

The project will cover the need of the hospital for an efficient and advanced way of managing patient records and ensure a smooth workflow between hospital's departments. Also, SBS hospital has the resource capacity ,financial ability, and good environment to carry out the project on the agreed time with a flexible schedule for any potential problems that could occur such as lack in human resources' skills and experience, or complex system bugs to fix and so on,

- **Recommendation:**

The project solves the system and health-records issues, as well as doing a complete analysis of the hospital's needs and workflow in order to provide an enhanced EHR with flexible capabilities. It should also have a user-friendly interface that improves the user experience. It's also critical to have some sort of extension that aids the physician in making evidence-based decisions about the patient's condition which is called Clinical Decision Support System CDSS.

-System Description:

- **Alternatives:**

Cerner System can be another great option for SBS hospital .It is a cloud-based EHR software used by health organizations of various sizes and specialties to streamline their operations and provide greater healthcare. It offers many great features such as charting, documentation, revenue management and health analytics.

- **System Description:**

The system will be installed on all medical staff computers with recommended configuration for each department. In general, the receptionist will take demographic info and medical history from the patient and enter it into the system, and the doctor will fill the patient visit form with info such as diagnosis and treatment that is aided by CDSS recommendations and store it in the health record. In the end, a bill is generated and the health record is updated and secured.

-Feasibility Assessment:

- **Economic Analysis:**

The implemented EPIC system can create additional costs that were not incurred with the previous system which are taken into consideration.

The first one is the System costs which include direct costs for building system infrastructure, for developing EHR applications, and other costs include purchasing office supplies and equipping departments with required hardware, and scanning the remaining existing paper charts and put them into the new EHR system. Also, the development of a friendly graphic interface and reliable clinical decision support system, have tremendously increased the price of the whole system.

The second cost can include provision of training manuals and trainers for the medical staff and assisting them along the system life etc.

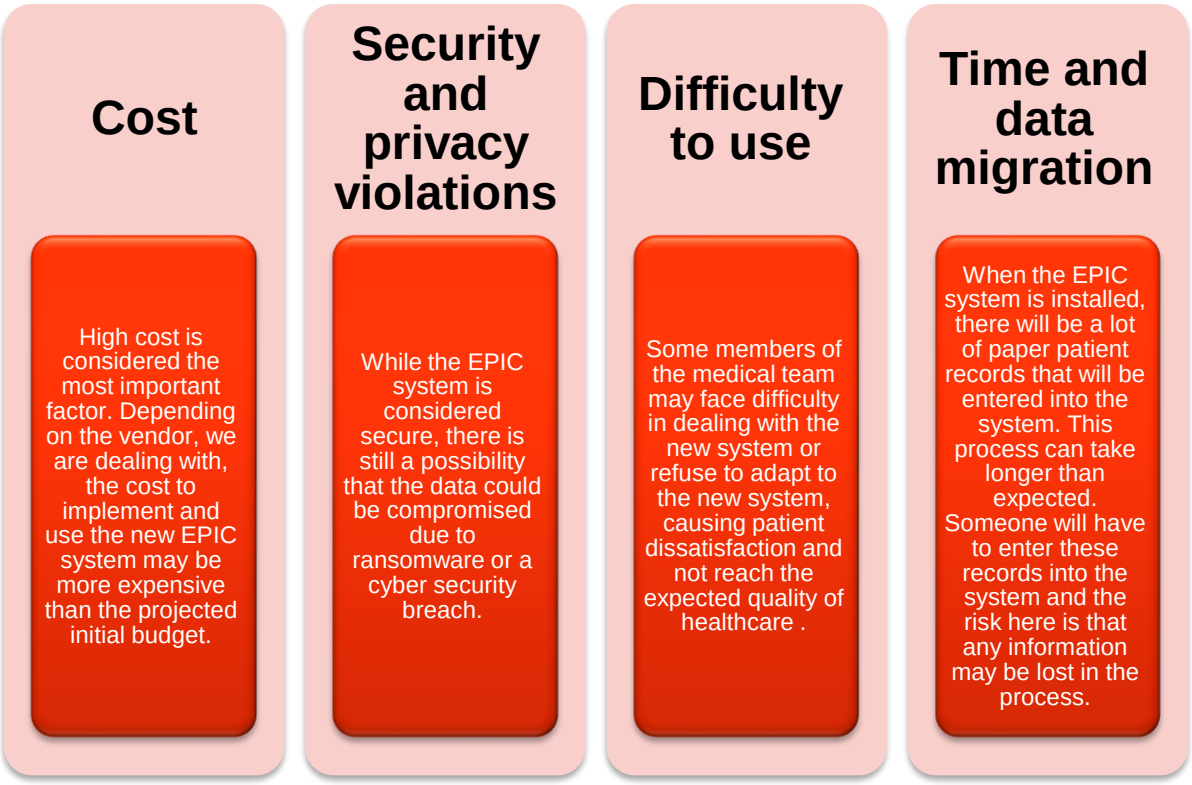
Therefore, the total cost of developing the system, its operational costs and other project matters have been calculated carefully. The total net cost of the system is 70 million dollars, and the expected cost recovery period is 10 years at a rate of 10%, which is equal to 7 million dollars each year.

The expected net profit during 10 years is 140 million dollars, or at a rate of 10%, which is equivalent to 14 million dollars each year.

- **Technical Analysis:**

Implementation of the EPIC system has the potential to enhance health care safety. However, there are several important risks which have been taken into consideration ,as upgrading to an entire enhanced system that can be overwhelming for patients and hospital staff.

Among the crucial risks that are expected to hinder the go-Live EHR are:



So, we are working on a manageable plan to manage the above potential risks.

- **Operational Analysis:**

When health care providers receive complete and accurate information via electronic health records in the Epic system, patients get better medical care. Electronic health records (EHRS) can improve the ability to diagnose diseases, reduce medical errors - improve patient outcomes and facilitate staff Medical case handling through the services of the EPIC system.

EPIC can reduce errors, improve patient safety, and support better patient outcomes, because the system not only contains or displays information, but the system keeps a record of the patient's medications or diseases, and it automatically checks for problems whenever a new drug is prescribed and alerts the doctor to problems potential.

The EPIC system helps the medical staff to deliver services faster and correct operational problems systematically. Also, displays potential safety problems when they occur, helping medical staff avoid more serious consequences for patients and lead to better outcomes by encourage medical staff to demonstrate adherence to best practices, producing complete, legible, and readily available records and allowing them to provide better patient care.

- **Legal Analysis:**

The EPIC system greatly helps to improve the quality of health care and reduce risks, however it is vulnerable to several risky legal issues. Some of these issues are continuously studied thoroughly to ensure the system won't be sued against .

One of these potential issues is when the system will require the medical staff to enter more detailed information into the patient's health records that might confuse him/her and make him/her more vulnerable to medical errors. And so ,one of the legal risks which may result due to the accuracy of the entered data in the system is that it can help in filing a case against medical staff because of unintended malpractice.

Another potential issue is the ability to modify ,share ,or delete some information or even the whole patient's electronic health records by unauthorized people will lead to breach sensitive data and privacy violation can lead to legal accountability to the medical staff or the health facility.

- **Political Analysis:**

All stakeholders have been clearly identified and put into consideration in every project step to ensure highest satisfaction possible. The EPIC system will be of great benefit to the hospital director, doctors and patients, as it facilitates the manager's work to reach all departments with ease. And so, the medical staff can access any medical file for any patient and access all medical history, analyzes, x-rays, etc. For the patient, it is easy for him to have his sick history and not need to tell his history with every visit to the doctor in any hospital he goes to .As well as hospital committees specifications and demands are kept in mind.

- **Schedule, Time-Line, Resource Analysis:**

after conducting PERT and Critical path analysis the project will take two year maximum. Also, Gantt chart and network diagram results was used for determining the best sequence of tasks which later ensured the best utilization of resources and flexibility in attaining project's objectives.

-Management Issues:

- **Team Configuration and Management:**

The project team consists of a combination of high-skilled members and roles are given to each accordingly .

The team in the project consisted of 20 members which are : 1 project manager , 3 from the team received the task of analyzing information and requirements,5 Health informatics (HI) specialists, 5 IT specialists ,3 HI Specialists as trainers for end users ,3 of the team were looking for the deficiencies and conducting regular testing.

- **Communication Plan:**

We decided to meet on a daily basis at the beginning of the day at 10 am. The team members will discuss with the project manager about what they have done in the past day, exchange views and develop a plan for the tasks that they will accomplish for this day . If a team member needs to communicate with any other member of the team via WhatsApp app ,via email or phone call, and all these data are saved in a shared file for reference and fast access.

- **Project Standards Procedures:**

The team conducted weekly tests(prototypes) of the system and revised it with stakeholders after the end of each part of the project to take their feedback to meet their needs and avoid the presence of errors that hinder the project progress as much as possible.

Analysis Phase

Learning Outcome(s):

CLO2: Describe the role of analysis and design in software development.

CLO3: Recognize different concepts, principles, and software modelling techniques.

CLO5: Illustrate most common analysis and design techniques in the form of a group project.

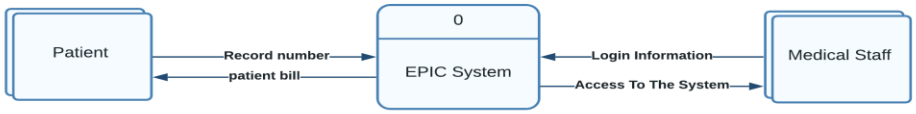
Under this section, include the following:

- **List the functional and nonfunctional business requirements for the system.** (1 mark)
- **Create the complete DFD (Data Flow Diagram) for your own system.** (2.5 marks)

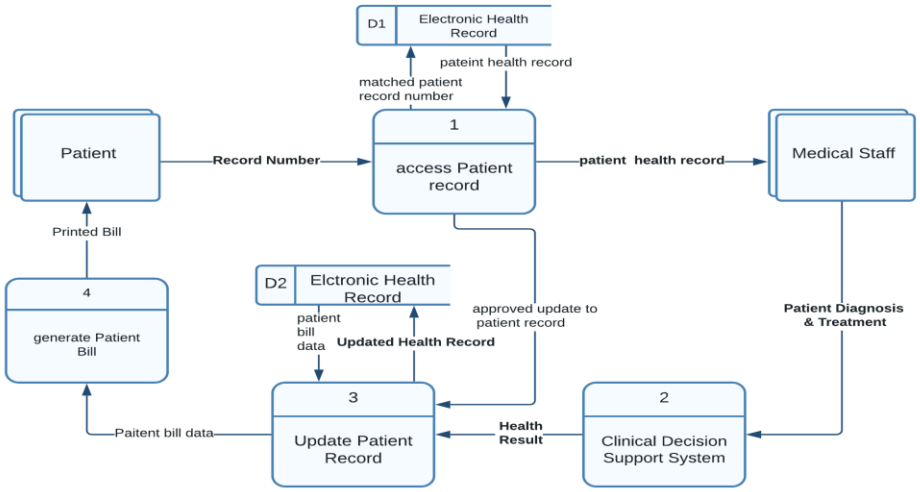
--*-*-*-*-*-*Functional & non-Functional Requirement*-*-*-*-*-*-*-*

Functional requirement	Non-Functional requirement
1. Clinical rules databases with alerts 2. E-prescribing with full interaction checks and alerts 3. registering the patient's full medical info and history 4. Bar coding and OCR integration 5. real-time protection from viruses and attacks 6. user-friendly interface	1. retrieve patient's record within 1 second 2. interoperability with hospital's departments information system 3. generate a unique patient's ID for each patient 4. 3 hours as max maintenance time 5. allow up to 250 concurrent user 6. require strong passwords generated uniquely for each system user 7. Weekly system minor updates , monthly major updates and immediate updates for risky bugs 8. Hourly backups for the patients records maintain a consistent patient information

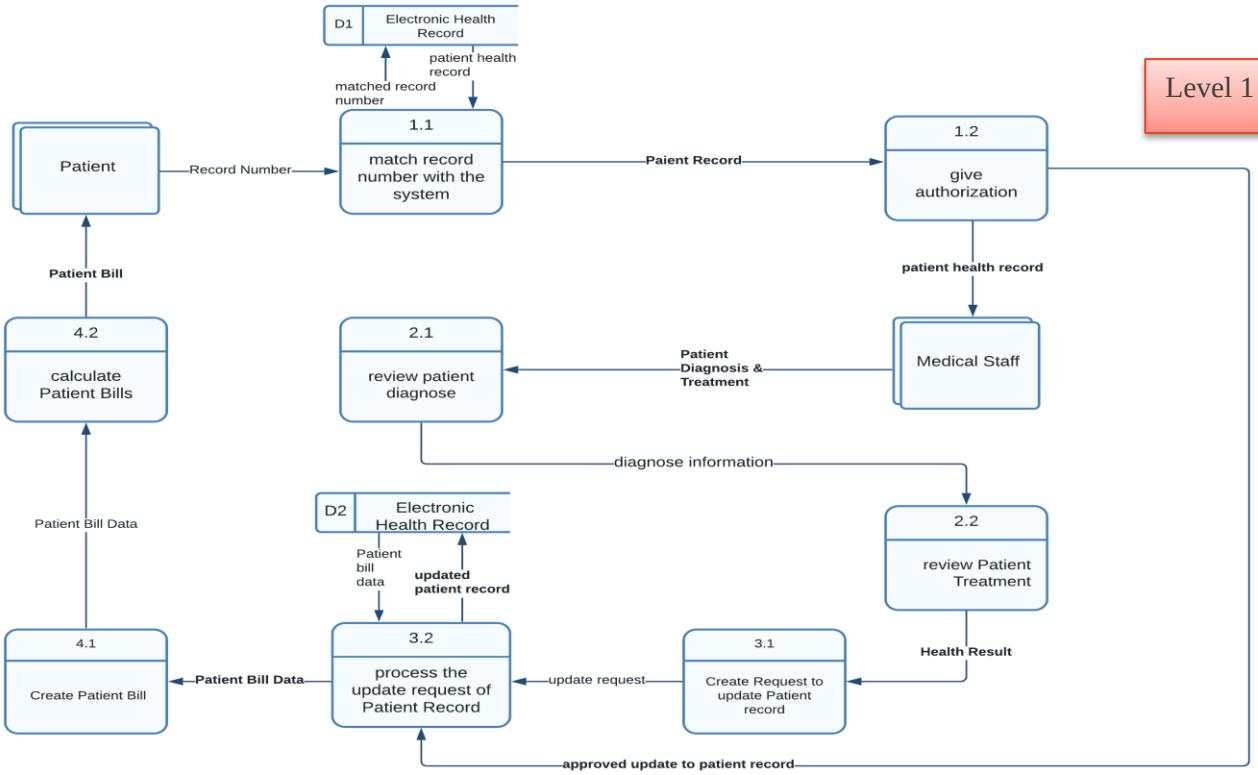
--*-*-*-*-*-*-*-*-*DFD*-*-*-*-*-*-*-*-*-*-*



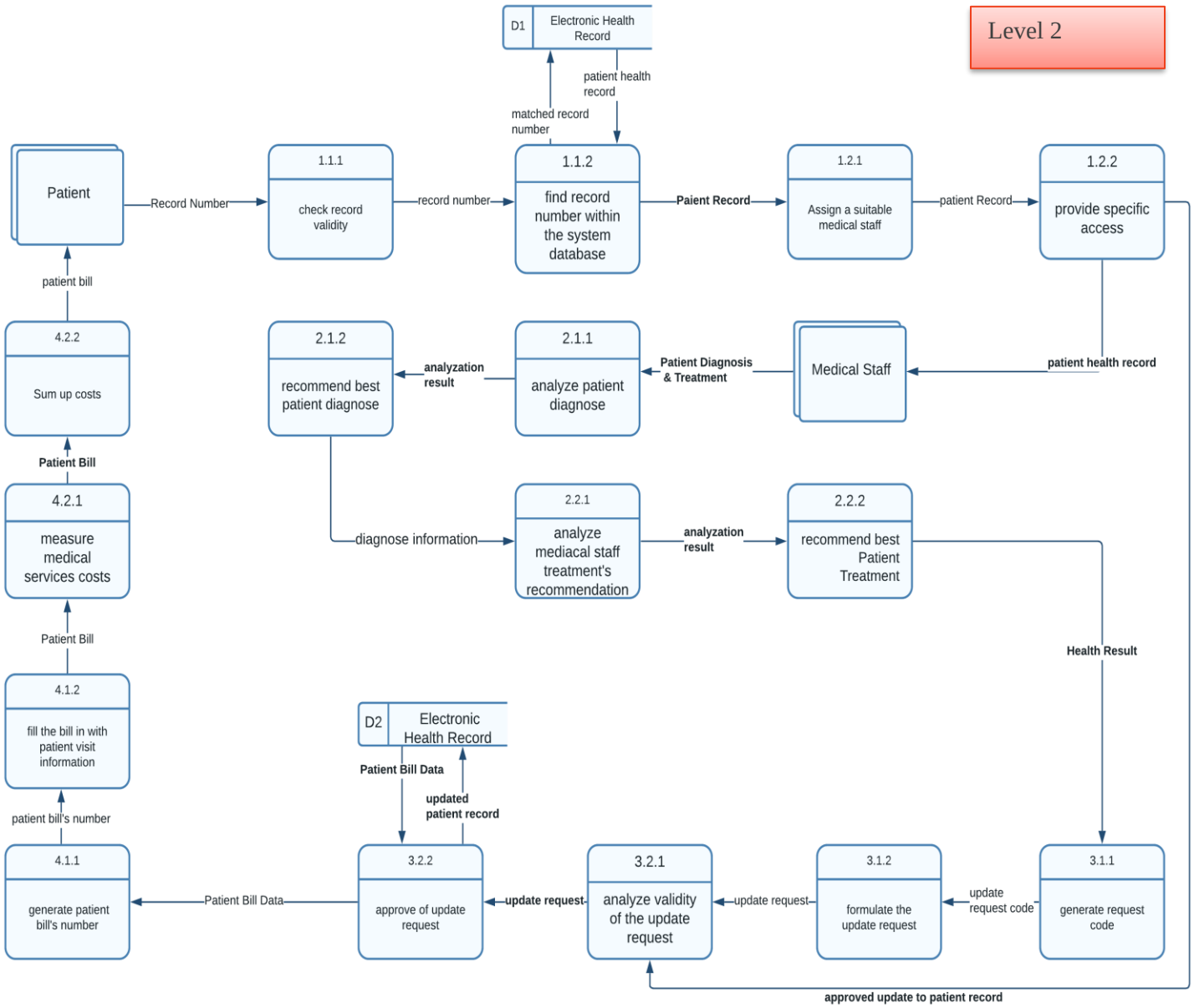
Context Level



Level 0



Level 1


Level 2
D1
Electronic Health Record
patient health record
matched record number
Patient
Record Number
1.1.1
check record validity
record number
1.1.2
find record number within the system database
Paient Record
1.2.1
Assign a suitable medical staff
patient Record
1.2.2
provide specific access
patient bill
4.2.2
Sum up costs
2.1.2
recommend best patient diagnose
analyzation result
2.1.1
analyze patient diagnose
Patient Diagnosis & Treatment
Medical Staff
patient health record
Patient Bill
4.2.1
measure medical services costs
diagnose information
2.2.1
analyze mediacal staff treatment's recommendation
analyzation result
2.2.2
recommend best Patient Treatment
Health Result
Patient Bill
4.1.2
fill the bill in with patient visit information
D2
Electronic Health Record
Patient Bill Data
updated patient record
patient bill's number
4.1.1
generate patient bill's number
Patient Bill Data
3.2.2
approve of update request
update request
3.2.1
analyze validity of the update request
update request
3.1.2
formulate the update request
update request code
3.1.1
generate request code
approved update to patient record

Design Phase

Learning Outcome(s):

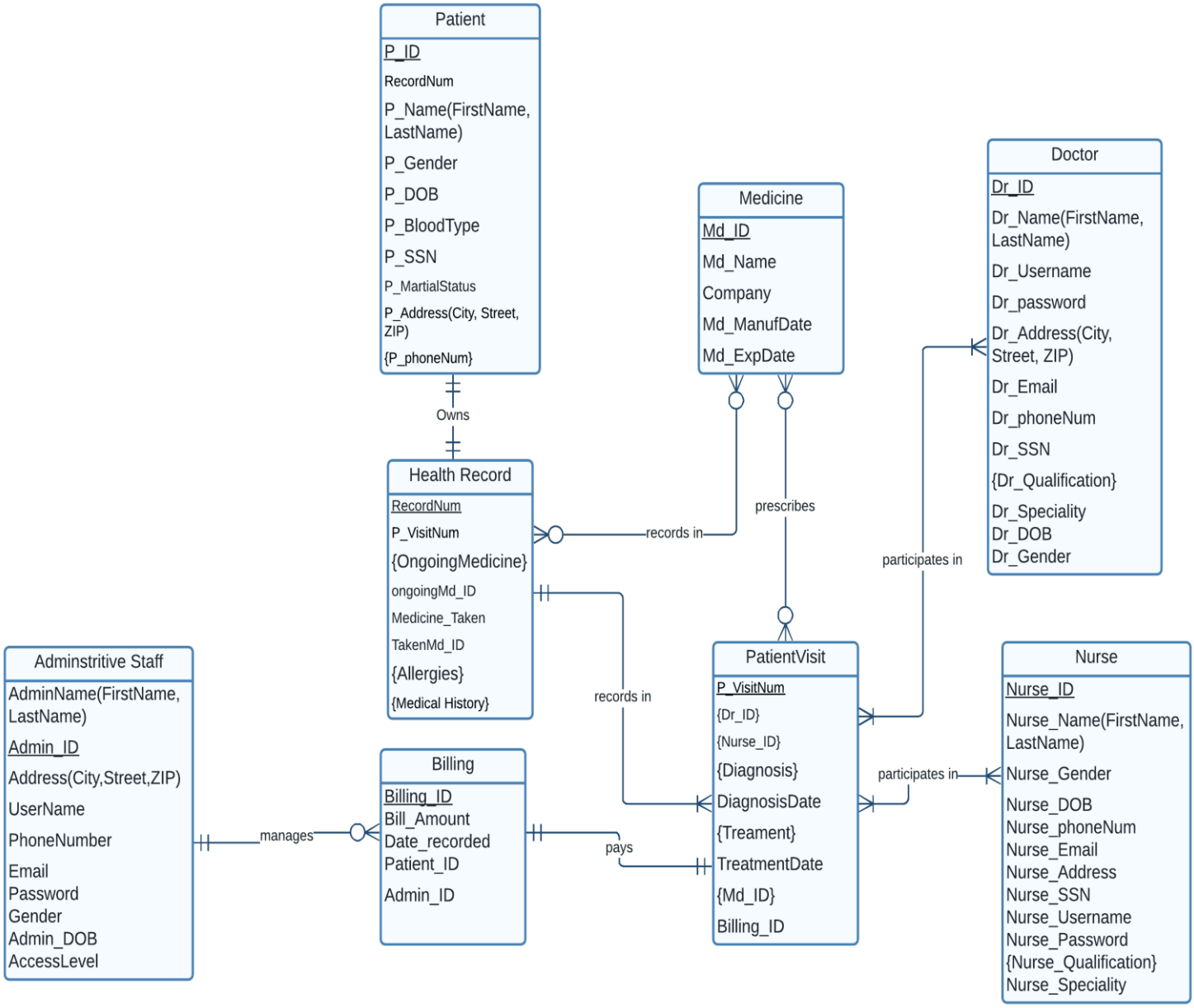
CLO2: Describe the role of analysis and design in software development.

CLO3: Recognize different concepts, principles, and software modelling techniques.

CLO5: Illustrate most common analysis and design techniques in the form of a group project.

Under this section, include the following:

- **Use the ERD (Entity Relationship Diagram) to design the database of the information system.** (2.5 marks)


Patient
P_ID
RecordNum
P_Name(FirstName, LastName)
P_Gender
P_DOB
P_BloodType
P_SSN
P_MartialStatus
P_Address(City, Street, ZIP)
{P_phoneNum}
Owns
Medicine
Md_ID
Md_Name
Company
Md_ManufDate
Md_ExpDate
Doctor
Dr_ID
Dr_Name(FirstName, LastName)
Dr_Username
Dr_password
Dr_Address(City, Street, ZIP)
Dr_Email
Dr_phoneNum
Dr_SSN
{Dr_Qualification}
Dr_Speciality
Dr_DOB
Dr_Gender
Health Record
RecordNum
P_VisitNum
{OngoingMedicine}
ongoingMd_ID
Medicine_Taken
TakenMd_ID
{Allergies}
{Medical History}
records in
prescribes
participates in
records in
Adminstritive Staff
AdminName(FirstName, LastName)
Admin_ID
Address(City,Street,ZIP)
UserName
PhoneNumber
Email
Password
Gender
Admin_DOB
AccessLevel
manages
Billing
Billing_ID
Bill_Amount
Date_recorded
Patient_ID
Admin_ID
pays
PatientVisit
P_VisitNum
{Dr_ID}
{Nurse_ID}
{Diagnosis}
DiagnosisDate
{Treament}
TreatmentDate
{Md_ID}
Billing_ID
participates in
Nurse
Nurse_ID
Nurse_Name(FirstName, LastName)
Nurse_Gender
Nurse_DOB
Nurse_phoneNum
Nurse_Email
Nurse_Address
Nurse_SSN
Nurse_Username
Nurse_Password
{Nurse_Qualification}
Nurse_Speciality

-

RESOURCES:

Choi, j. S., lee, w. B., & rhee, p. L. (2013). Cost-benefit analysis of electronic medical record system at a tertiary care hospital. Healthcare informatics research, 19(3), 205–214. Https://doi.org/10.4258/hir.2013.19.3.205.

O'connor, s. (2017, january 31). Top 5 risks you may encounter after an ehr software implementation. Advanced data systems corporation. Retrieved december 1, 2021, from https://www.adsc.com/blog/top-5-risks-you-may-encounter-after-an-ehr-software-implementation.

It, h. (2019, june 4). Improved diagnostics & patient outcomes. Healthit.gov. Retrieved december 1, 2021, from https://www.healthit.gov/topic/health-it-and-health-information-exchange-basics/improved-diagnostics-patient-outcomes.

Wiljer, D., Urowitz, S., Apatu, E., DeLenardo, C., Eysenbach, G., Harth, T., ... & Leonard, K. (2008). Patient accessible electronic health records: exploring recommendations for successful implementation strategies. *Journal of Medical Internet Research*, *10*(4), e1061.

Øvretveit, J., Scott, T., Rundall, T. G., Shortell, S. M., & Brommels, M. (2007). Improving quality through effective implementation of information technology in healthcare. *International Journal for Quality in Health Care*, *19*(5), 259-266.