Project Proposal

On

**Pharmacy Management System**



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Computing Project

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# **Introduction**

## **Project Introduction**

In the field of Health care industry, information and communication technology has played a vital role nowadays in order to store data securely and to access them easily in a short period of time. So, I have decided to develop a technically appropriate and user-friendly system for Pharmacy to manage the drugs and consumables in pharmacy unit.

Pharmacy management system is vigorous and technology integrated system. It deals with the management of the medicine and consumable materials for the patients. And I am intending to develop the system that maintains all the sections related to Pharmacy like consumables drugs for patients and its billing system. With the help of this management system, people will get the correct medication with right dosage of medicine. This will boost the productivity of the clinical work and enhance easiness for patient’s medication.

## **1.2 Justification for project**

### 1.2.1 Background of the project

In general, the project am going to develop will be based on web-based application with user-friendly interface that can be used by both pharmacist and the patients. Pharmacist will process the prescription of drug and maintains other Pharmacy related work while patients will be ordering or buying the medicine suggested by their doctors. It will also deal with the automated bill generating task.

The system will be storing details of drugs like its quantity, expiry date, manufactured date, price and other related information. The stocks details will also be maintained. It will also provide customer to log into the system to place their order. This management system will enhance the efficiency of the patient’s ease and makes convenient in accessing data of the medicine, provides security in data input and output. And manual task will be replaced by automated task like manual calculation of medicine will be replaced by automated bill generation which will save time and effort. All the important data will be back up securely in the cloud or other external drive to prevent from potential risk.

### Problem Statement

In the present situation, the medicine stock management is very poor that a pharmacist needs to check the stock time to time manually and documenting the stock details in the paper-based work which has consumed a lot of time. And this makes pharmacist unknown about stock when customer places the order. So, this project will warn about the medicine stock. And the pharmacist will be prepared about order of the medicine that are demanded more by the customer. Also, pharmacist has to calculate their daily financial activities manually which has results error in the budgets.

Another problem is that customer is finding difficulties in selecting the trusted medicine according to their illness as they are unknowingly consuming expired medicine which has affected the health of the customer. Therefore, this system will manage to select the correct medicine for the customer. Also, customer is buying their medicine by visiting to the medicine store and searching their medicine store to store if they do not find them. To minimize these problems and to ease customer ordering, this project is being developed that will maintain time, cost, quality and other necessary requirements of the system.

## **1.3 Description of the project**

### 1.3.1 Features

The features included in the project are as follow;

* Customer and pharmacist registration and login system
* Changing the login password
* Store data of medicine and related information
* Update, edit and delete the medicine information
* Effective search of medicine
* Warn the pharmacist when medicine item is low
* Record the customer orders
* Generate a report of the bill

And other non-functional features are as follow;

* User-friendly
* Reliable
* Good performance
* Independent of working platform
* Secure operation

# 2. Project Scope

## 2.1 Scope and Limitation of project

### Scope:

The scope of the project is limited that will include the stock management, maintain health outcomes with appropriate medicine consumption, enhance access of available medicine in the store and improving the efficiency of the pharmacy. And replacing the manual calculation with automated bill generation.

### Limitation:

The current project will only allow the customer to place their order of the medicine but when the bill is generated, they have to come to store for their payment as the project lacks online payment system.

But this can be updated later with new requirements.

## 2.2 Aims and Objectives

The aims and objectives of the project are as followed;

### Aims

* The aim of the project is to maintain the consumable drugs for the patient, manage the medicine stock and generate an automated bill.

### Objectives

* It provides the user-friendly interface.
* It helps to maintain all the sections related to pharmacy.
* It deals with the automated generating bill of the medicine.
* Safe data input and output, Update, edit and delete medicine information, Fast searching of the medicine.
* Customer can easily place their order.
* Secure and reliable information storage of medicine and customer.
* To enhance the efficiency of the clinical’s work.

# **3. Development Methodology**

## 3.1 Methodology used

I have chosen Waterfall methodology for the development of my project. Waterfall model is the simplest and earliest software development approach to ensure success of project. It is linear-sequential software development model in which development is seen as flowing steadily downwards like a waterfall through phases of requirement analysis, design, implementation, testing, deployment and maintenance. In this model, each phase must be completed before beginning another phase and the phases are not overlapping.

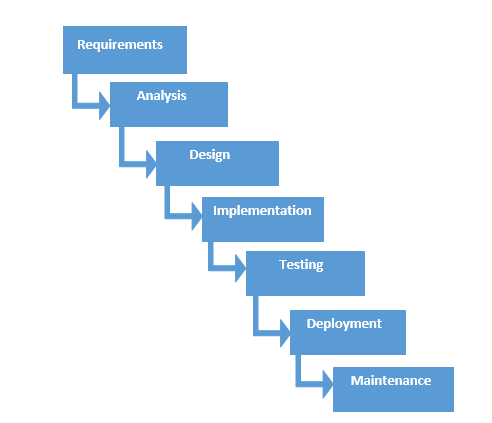


Figure 1: Waterfall model

And the six phases of water model are as follow;

1. **Requirement analysis**

All potential requirements are analyzed and documented in a proper requirement specification document. This phase describes what the system will do.

1. **Design**

With the input of requirement specification from first phase, overall system architecture is specified such as hardware and software, programming language etc.

1. **Implementation**

The system is then developed using all models, business logic and service integration.

1. **Testing**

Here the implemented system is tested -using unit testing, white box testing, integration testing and other testers- for its functionality. Any failure and faults are identified.

1. **Deployment**

After testing is done, the product is deployed to the customer environment.

1. **Maintenance**

And to keep the system updated and functional, better versions and patches are released in order to fix the bugs identified.

I choose Waterfall model because of the following reasons;

1. As waterfall model is suitable for small projects like mine and it is easy to understand and simple to use.
2. This model works well where the requirements are clear and understandable.
3. Due to its rigidity, it is easy to manage and each phase has specific goals and review process.
4. It helps to measure project milestones.

## 3.2 Design Pattern

I have applied MVC design pattern for system implementation and MVC stands for “Model-View-Controller”. It is design model of three interconnected parts and is widely used for developing user-interface.

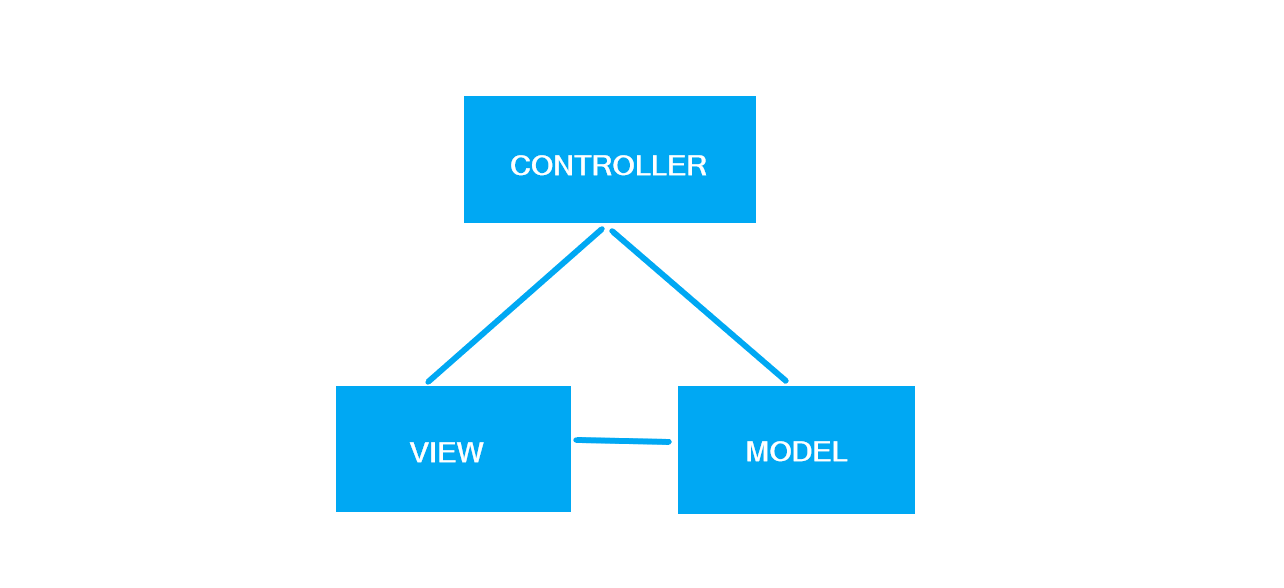


Figure 2: MVC design pattern

The three interconnected parts includes model, view, and controller. And each component has their own role in MVC design pattern.

1. **Model**

It carries data and can contain business logic used by the program.

1. **View**

It represents the GUI part with which user will interact.

1. **Controller**

It controls the data flow into model and update view. It connects user with the system.

The reason behind choosing MVC design pattern for my project are as follow;

1. Supports fast and parallel development system.
2. Provides multiple views.
3. Less code duplication as data and business logic is separated.
4. Modification can be done easily that changes won’t affect entire model.
5. Supports for asynchronous technique.

## 3.3 System Architecture

System architecture is the abstract model that describes the structure, behavior and views of the system. And the system architecture I have chosen for my project is 3-tier architecture. It is the software architecture that keeps business logic, user interface and data storage in isolated platform.



Figure 3: 3-tier architecture

The three tiers in 3-tier architecture are as follow;

1. **Presentation tier**

It is the top-level tier that shows services’ information accessible on a website. It sends results to browser and other tier in network for its communication with another tier.

1. **Application tier**

It is the middle-tier and also known as business logic tier. Here, application’s functionality is controlled by performing detailed processes.

1. **Data tier**

It is the down-level tier that contains database server (data are stored and retrieved). Data are kept independent of application servers and business logic.

The benefits of using 3-tier architecture are as follows;

1. It separates Presentation tier, Applicated tier and Data tier logically.
2. It helps to enable parallel development of each tier as each are independent of one another.
3. Modification can be easily done.
4. Functionality can be reused.

# 4. Work Breakdown Structure (WBS) / Scheduling

## 4.1 Work Breakdown Structure

Work breakdown structure is defined as the hierarchical structure which reflects the decomposition of work done in the project into manageable sections. It makes project execution simple and understandable. Project’s work is subdivided because of the following reasons;

1. It defines and manages the work of the project.
2. It measures the milestones of the project.
3. It helps in estimation of project cost, time and identifies risk.
4. It indicates the project scope which makes stakeholder to understand easily.
5. It can be used to display and allocate responsibilities.

In my project of Pharmacy management system, its task has also been subdivided and created a work breakdown structure. The main subdivided parts are Project Management, Analysis, Design, Implementation, Testing and Deployment. And these are further divided into sub-division and this are indicted in following WBS chart;

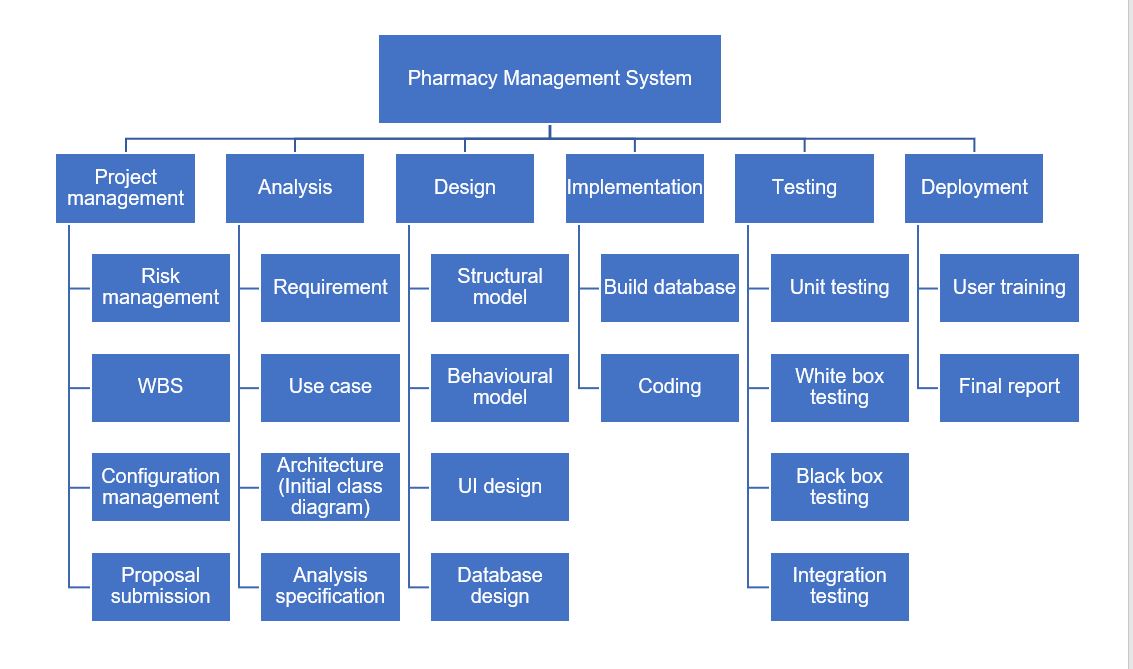


Figure 4: Work breakdown structure

## 4.2 Milestones

|  |  |
| --- | --- |
| **Milestones** | **Date** |
| **Project Management**  Risk Management  WBS  Configuration Management  Proposal Submission | 21/12/2018 to 03/01/2019  21/12/2018 to 25/12/2018  26/12/2018 to 27/12/2018  28/12/2018 to 31/12/2018  01/01/2019 to 03/01/2019 |
| **Analysis**  Requirement  Use Case  Architecture (Initial Class Diagram)  Analysis Specification | 04/01/2019 to 28/01/2019  04/01/2019 to 14/01/2019  15/01/2019 to 18/01/2019  19/01/2019 to 24/01/2019  25/01/2019 to 28/01/2019 |
| **Design**  Structural Diagram  Behavioral Diagram  UI Design  Database Design (ER, Data Dictionary) | 29/01/2019 to 27/02/2019  29/01/2019 to 03/02/2019  04/02/2019 to 10/02/2019  11/02/2019 to 20/02/2019  21/02/2019 to 27/02/2019 |
| **Implementation**  Build Database  Coding | 28/02/2019 to 31/03/2019  28/02/2019 to 04/03/2019  05/03/2019 to 31/03/2019 |
| **Testing**  Unit Testing  Integration Testing  Blackbox Testing  Whitebox Testing | 01/04/2019 to 10/04/2019  01/04/2019 to 04/04/2019  05/04/2019 to 07/04/2019  08/04/2019 to 08/04/2019  09/04/2019 to 10/04/2019 |
| **Deployment**  User Training  Final Report | 11/04/2019 to 21/04/2019  11/04/2019 to 16/04/2019  17/04/2019 to 21/04/2019 |

**Description of Milestones:**

Milestone is the measure of the project achievements via deadlines.

* **Project Management (14 days)**

The total days allocated for project management is 14 days. And I have allocated for;

* + Risk management – 5 days
  + Work breakdown structure (WBS) – 2 days
  + Configuration management – 4 days
  + Proposal submission – 3 days
* **Analysis (25 days)**

The total days allocated for analysis is 25 days. And I have allocated for;

* + Requirement – 11 days
  + Use case – 4 days
  + Architecture (Initial class diagram) – 6 days
  + Analysis specification – 4 days
* **Design (30 days)**

The total days allocated for design is 30 days. And I have allocated for;

* + Structural model – 6 days
  + Behavioral model – 7 days
  + UI design – 10 days
  + Database design – 7 days
* **Implementation (32 days)**

The total days allocated for implementation is 32 days. And I have allocated for;

* + Build database – 5 days
  + Coding – 27 days
* **Testing (10 days)**

The total days allocated for testing is 10 days. And I have allocated for;

* + Unit testing – 4 days
  + White box testing – 2 days
  + Black box testing – 1 days
  + Integration testing – 3 days
* **Deployment (10 days)**

The total days allocated for deployment is 10 days. And I have allocated for;

* + User training – 6 days
  + Final report – 4 days

## 4.3 Scheduling / Gantt Chart

Scheduling is the project planning which lists the project’s milestones, activities and deliverables that includes start and finish dates of each task in the project. It ensures project’s success, allocate resources and set realistic time-frame.

And scheduling of my project is shown through the following Gantt chart;

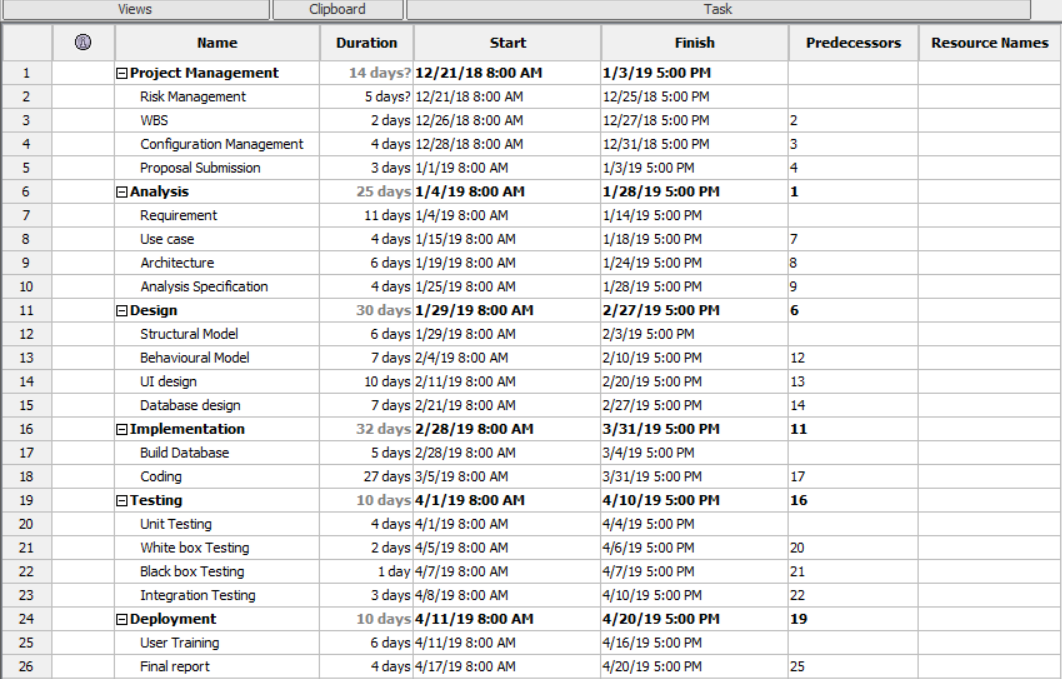


Figure 5: Gantt chart 1

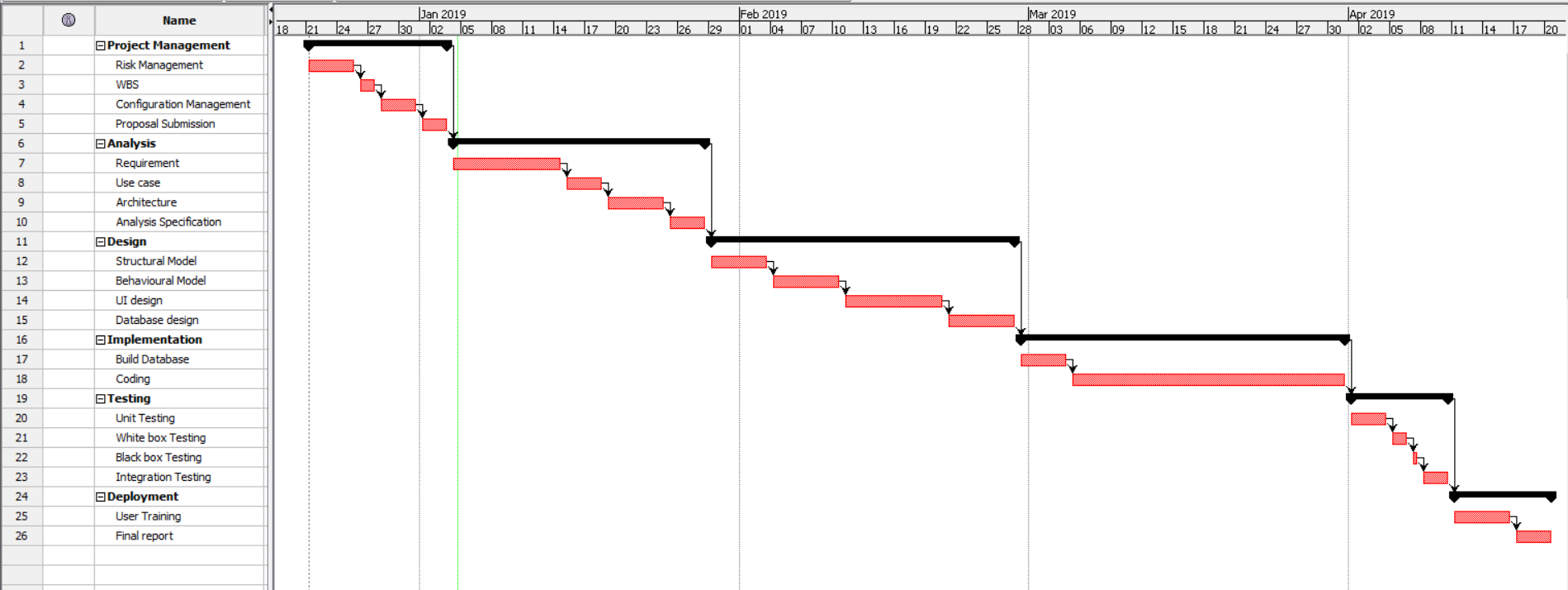


Figure 6: Gantt chart 2

# 5. Risk Management

Risk management is the identification and prioritization of risks and analyzing with various tools and economical application resources to minimize their impact on the system. It also identifies the possible problem before it arises so as to plan the risk-handling activities. Vulnerability assessment is also another term for risk management.

And risk can be controlled by identifying their likelihood, consequences and impact on the system. To analyze impact of risk, I have used following formula;

Impact = Likelihood \* Consequence

Risk Likelihood values are shown as follows

|  |  |
| --- | --- |
| Likelihood | Value |
| Low | 1 |
| Medium | 2 |
| High | 3 |

Risk Consequence values are shown below

|  |  |
| --- | --- |
| Consequence | Value |
| Very low | 1 |
| Low | 2 |
| Medium | 3 |
| High | 4 |
| Very High | 5 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S. No | Risks | Likelihood | Consequences | Impact | Solution |
| 1 | Denial of service attack | 2 | 4 | 8 | Bandwidth must be added in order to handle the spikes in the traffic and make the system DDoS resistant. |
| 2 | Hard disk failure | 1 | 4 | 4 | All the data must be backed up in external drive or in cloud and hard disk must be monitored properly. |
| 3 | Changes of requirement | 3 | 5 | 15 | Requirements must be analyzed properly from the stakeholders before beginning the project. And any changes must be done as per them. |
| 4 | Stakeholder conflicts | 2 | 5 | 10 | Identify powerful and influential stakeholder in order to have correct set of resources and invest. |
| 5 | Fault in Scheduling | 3 | 4 | 12 | Proper schedule planning must be done and make sure none of the task will exceed its deadline. |
| 6 | Power fluctuation | 3 | 3 | 9 | Power spikes results component failure so point of use protector should be implemented in every specific area which provide protection from variance of power supply. |
| 7 | Lack of resources | 1 | 4 | 4 | Before beginning the project, all the resources required must be analyzed and collected. |

# 6. Configuration Management

Configuration management is the way of creating and maintaining steadiness between physical and logical assets in an operational environment throughout project life (WhatIs.com, Configuration management, 2008). For example: consistency of product’s performance, design, operational information etc. It identifies bad configuration changes and ensures quick service restoration.

And the configuration management of my project is successfully created which consists of the directories included in the project. The backup of vital aspects is maintained.

The tree structure of the project is shown below;

# **7. Conclusion of the project**

In conclusion, I have provided the background of my project and identified all the problems by researching in different pharmacy store. The aims and objectives are clearly presented in the proposal and the potential risk has been identified and provided the solutions to overcome those problems. The project has been scheduled using Gantt chart and work breakdown structure is created to understand the project clearly. Suitable development methodology, design pattern and system architecture were implemented for this management system.

# **8. References**

<https://www.tutorialspoint.com/sdlc/sdlc_waterfall_model.htm> [Accessed on 26th Dec,2018]

<https://www.interserver.net/tips/kb/mvc-advantages-disadvantages-mvc/> [Accessed on 26th Dec,2018]

<https://www.techopedia.com/definition/24649/three-tier-architecture> [Accessed on 26th Dec,2018]

<https://c2sconsultinggroup.com/the-importance-of-configuration-management/> [Accessed on 29th Dec,2018]

<https://www.slideshare.net/HabtamuAsmare/pharmacy-management-system-requirement-analysis-and-elicitaion-document> [Accessed on 04th Dec,2019]

**Requirement**

**and**

**Analysis Phase**

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# **Functional and Non-functional requirements of the project**

## **Functional requirements**

Those requirements which defines the functionality of the system i.e. what the system should do. And the requirement depends upon the type of software being developed. For example: for my project Pharmacy management system, its functional requirement can be;

* Add, Update, Delete medicine
* Search medicine
* Generate bill of the medicine etc.

## **Non-functional requirements**

Those requirements which defines the overall characteristics of the system i.e. it specifies how the system will perform a certain function. And the non-functional requirements for my project are as follow;

* User-friendly interface
* Security
* Accessibility
* Reliable etc.

|  |  |  |
| --- | --- | --- |
| Functional and Non-functional determination | Requirements | MoSCoW prioritization |
| F(R1) | Registration for Pharmacist | M |
| F(R2) | Login system | M |
| F(R3) | Store data of medicine and its related information | M |
| F(R4) | Update medicine information | M |
| F(R5) | Delete medicine information | S |
| F(R6) | Add medicine information | M |
| F(R7) | Effective search of medicine | M |
| F(R8) | Show stock details | M |
| F(R9) | Notify when stock is low | S |
| F(R10) | Generate bill for the medicine | M |
| NF(R11) | User-friendly interface | M |
| F(R12) | Keep details of vendor | S |
| F(R13) | Change password | S |
| F(R14) | Change profile of pharmacist | C |
| F(R15) | Verify password | M |
| NF(R16) | Secure operation | M |
| NF(R17) | Usability | M |
| NF(R18) | Reliable | S |
| NF(R19) | Good performance | S |
| NF(R20) | Independent of working platform | C |
| NF(R21) | Maintainability | C |
| NF(R22) | Accessibility | C |
| F(R23) | Add category | M |
| F(R24) | Update category | M |
| F(R25) | Delete category | M |

# **Use case diagram**

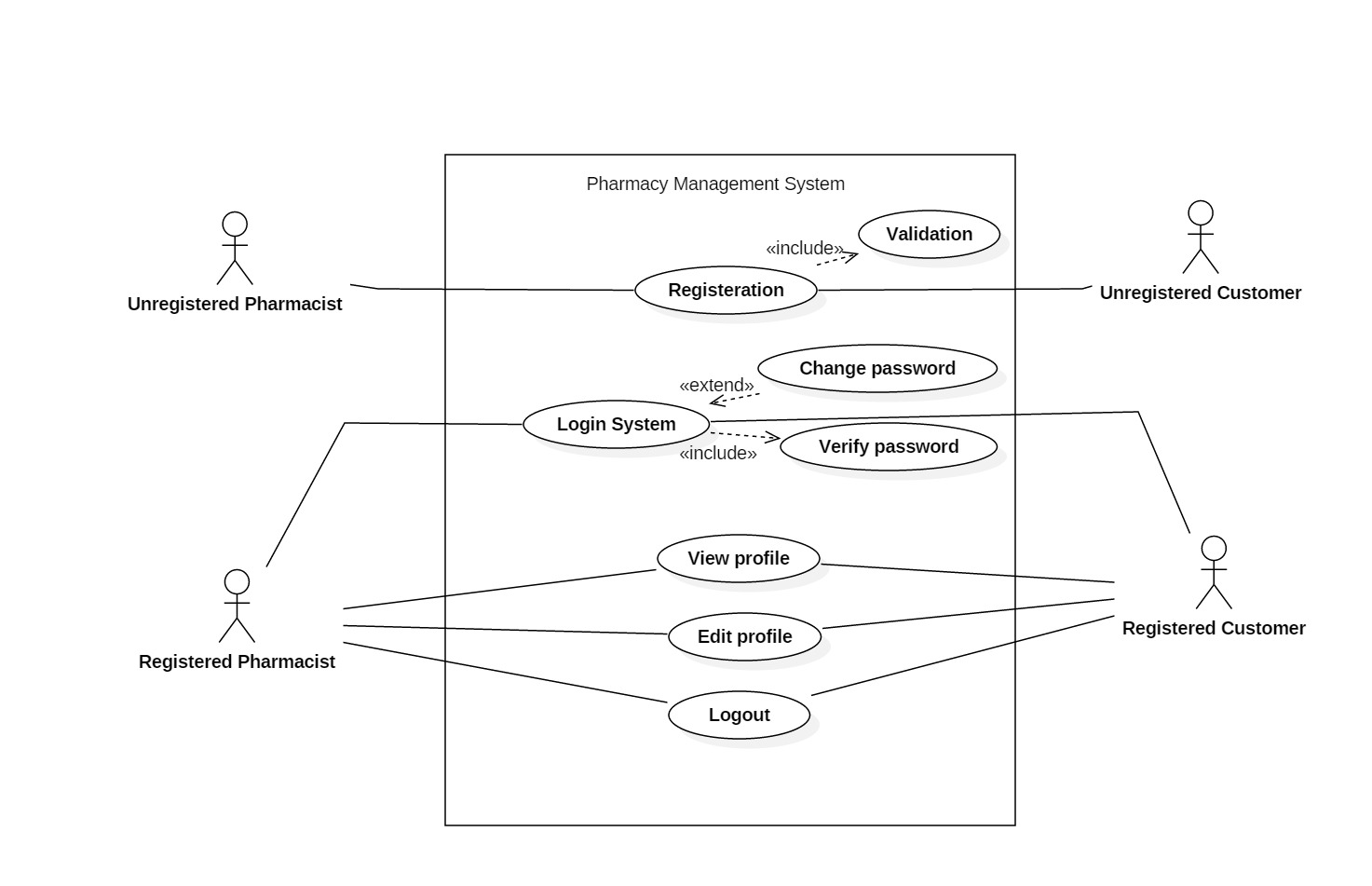
Use case diagram is a tool which portray broad interaction between actors and the system through its functionality defined as use case. It helps in requirement analysis as well as modelling the behavioral structure of the system. Also, it visualizes the functional requirement of the system translating them into a development priority.

The symbol and notation used in use case diagram are;

* **System:** A rectangular box showing system’s boundaries and contain use cases.
* **Use case:** A oval shape showing the role of the user within the system.
* **Actors:** A stick figure showing user who performs action in the system. Here, Pharmacist and customer are the actors.
* **Relationships:** A simple line showing the relation between actors and their related use cases.

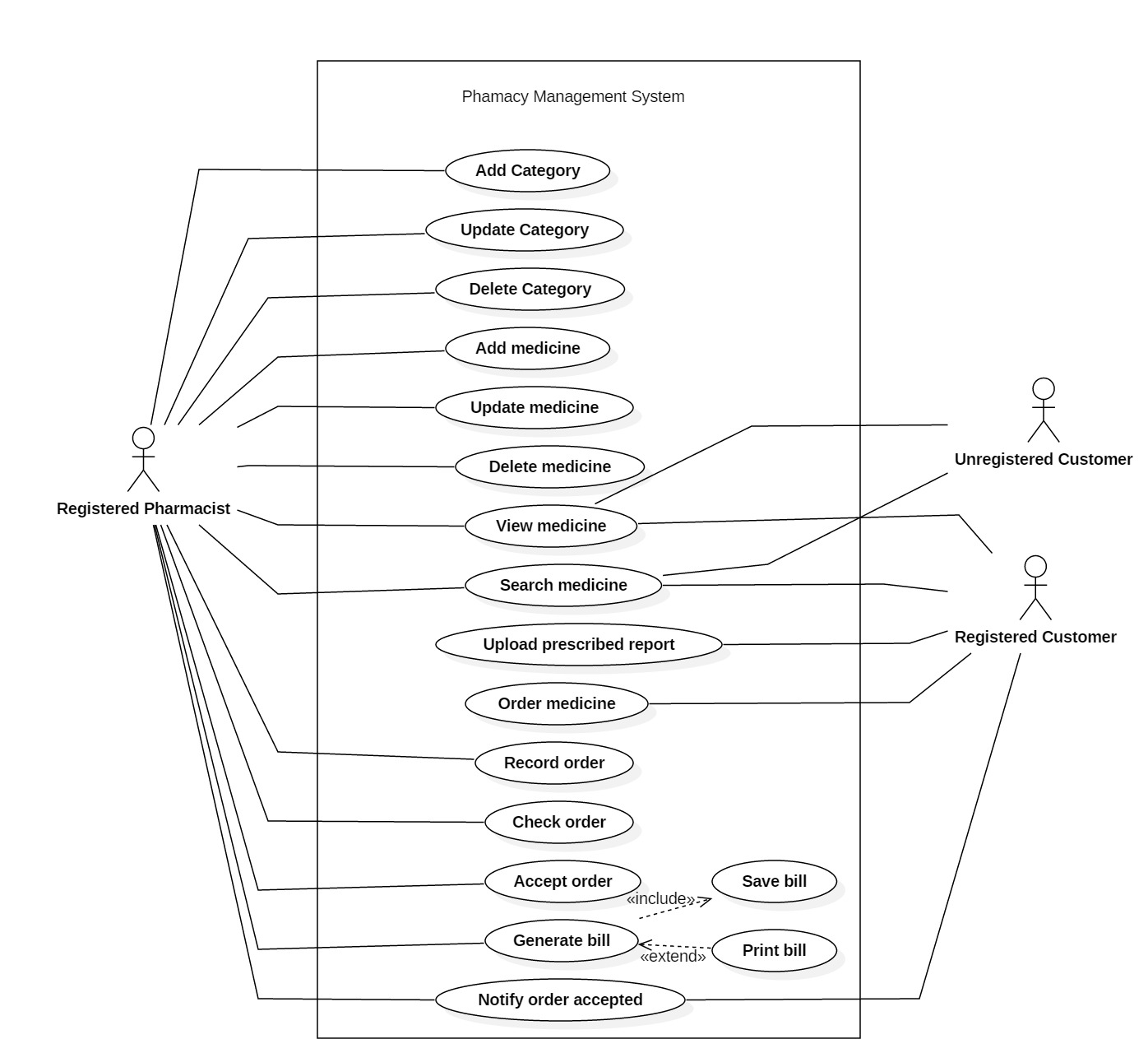
The use case diagram representing actors and their functionality is below;

### **Login and Registration Use case**



Above diagram is the use case diagram for login and registration of two types of user i.e. Pharmacist and customer. Both users should register in a system providing their information and then login with their unique email address and password. After login both users can view and edit their profile. They can change their password whenever they like. And only after login, customer can make their order and upload their prescribed report.

### **Registered Pharmacist and registered customer Use case**



Above use case describes the work of pharmacist (one who manages all the stuffs in the system) and customer (one who order and consume the medicine). General customer can view and search medicine. And registered pharmacist can only operate the system and record and accept order made by the serious customer. Authenticated customer can upload their prescribed report and place their order.

The use cases are explained below;

* **Registration**

To register in the system, user will have to provide their information along with unique email address.

* **Login**

With correct email address and password, user can log into the system and can access other authenticated functionality.

* **View profile**

After authentication, user can view their personal information.

* **Edit profile**

Edit profile is a function which will help user to update their profile when they like to change their details.

* **Add category**

Add category is the process of adding medicine category in the system. Pharmacist can only use this function after registration and login.

* **Update category**

Update category is the function where pharmacist can update the medicine category details if there is any mistake while adding the category.

* **Delete category**

It is the function to delete the medicine category when the category is not needed.

* **Add medicine**

Add medicine is the process of adding a medicine in the system. Pharmacist will be using this function to add different types of medicine.

* **Update medicine**

Update medicine function will help the pharmacist to update the details of medicine if there is any mistake while filling up the add medicine form.

* **Delete medicine**

This function helps pharmacist to delete the medicine when the medicine is out of stock.

* **View medicine**

View medicine is the function which helps the user to view the details of medicine.

* **Search medicine**

Search medicine is the process of searching the medicine the user wants. Any user can search medicine and see their details.

* **Upload prescribed report**

Registered customer can upload their prescription report and place their order for the medicine.

* **Order medicine**

Logged-in user can order medicine if they got the medicine of their need.

* **Record order**

It’s a function to make record of the order made by the customer. Pharmacist will be managing the stuffs related to order.

* **Check order**

It’s a function where pharmacist will view the list of order of the medicine.

* **Accept order**

Pharmacist will accept the order after checking the requested order. Order will only be accepted if the medicine is available in the stock.

* **Generate bill**

After accepting order, bill will be generated. Bill will be saved as well as printed.

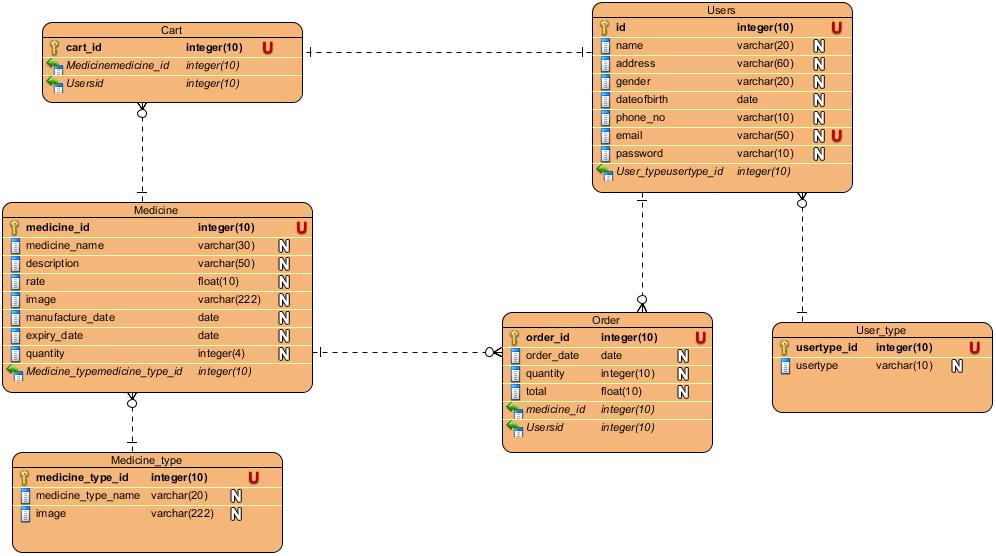
* **Notify order accepted**

The user will be notified after their order is accepted by the pharmacist.

# **ER-diagram**

Entity relationship diagram is the analytical structure of entities and their relationship in order to organize all the data within information system. Here, ER-diagram is developed with the help of UML Visual Paradigm. The aim of ER model is to develop a model of data that is non-technical and free of opacity.

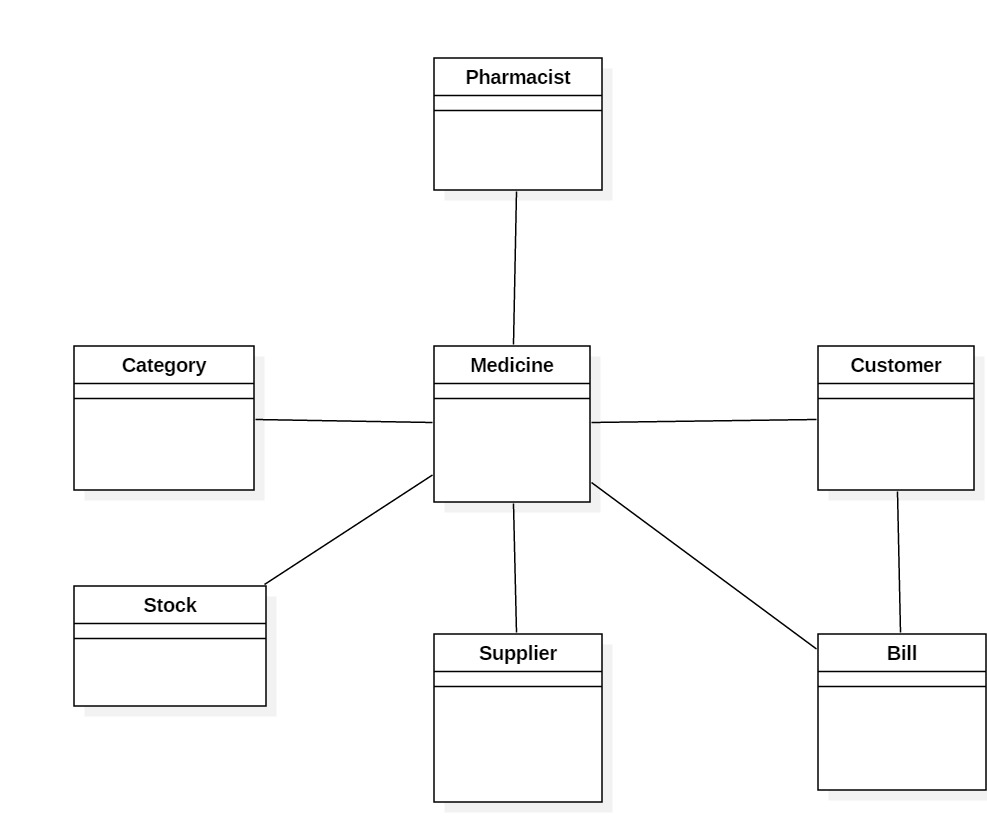
The ER-diagram of the project is shown below;



# **Initial class diagram**

The static structure providing the overview of the system through classes and defining the relationships among the classes.

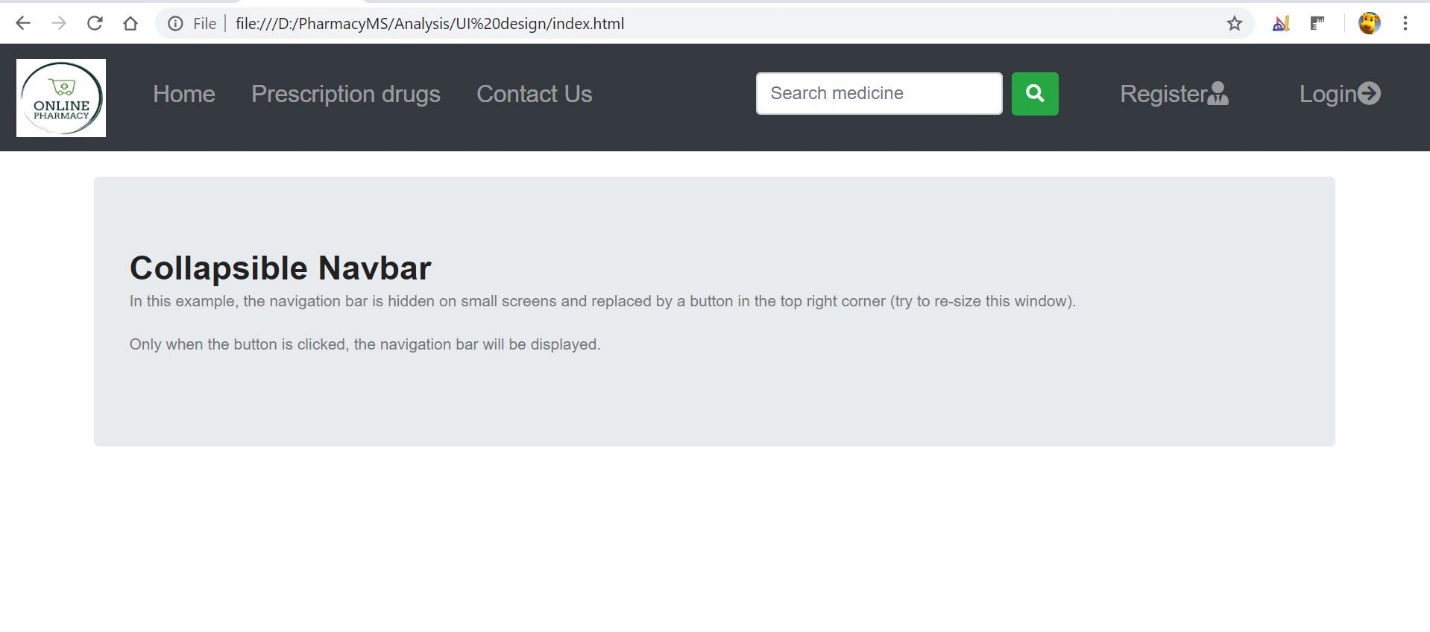
And the initial class diagram is shown below;



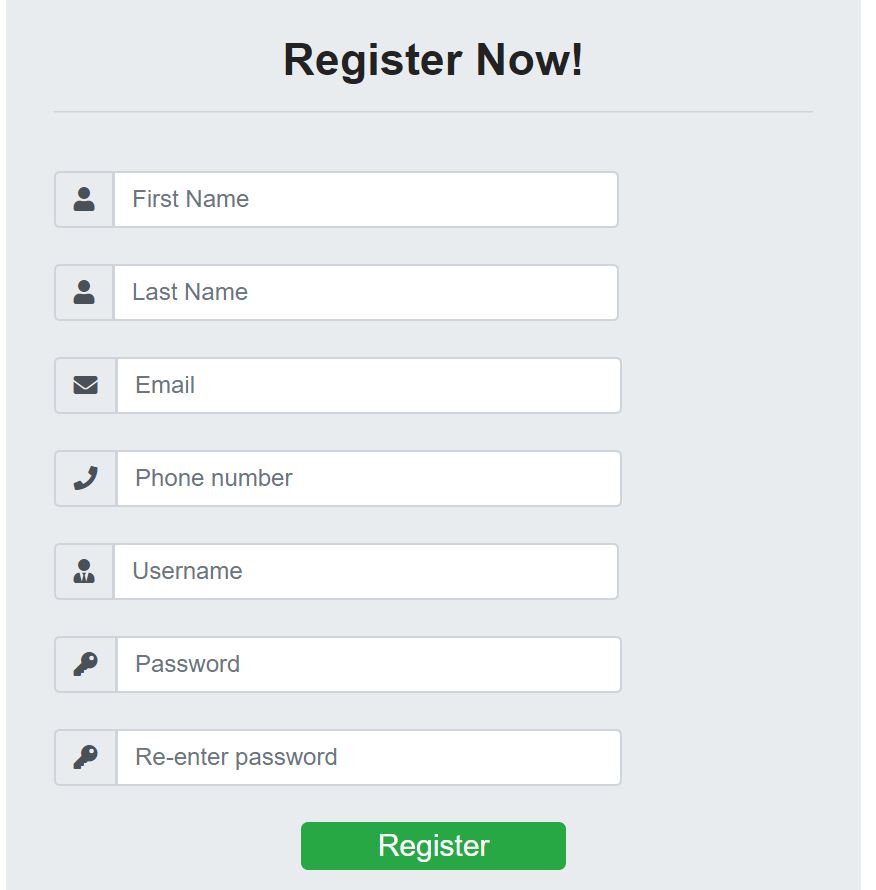
# **UI design**

The user interface of the are as follow;

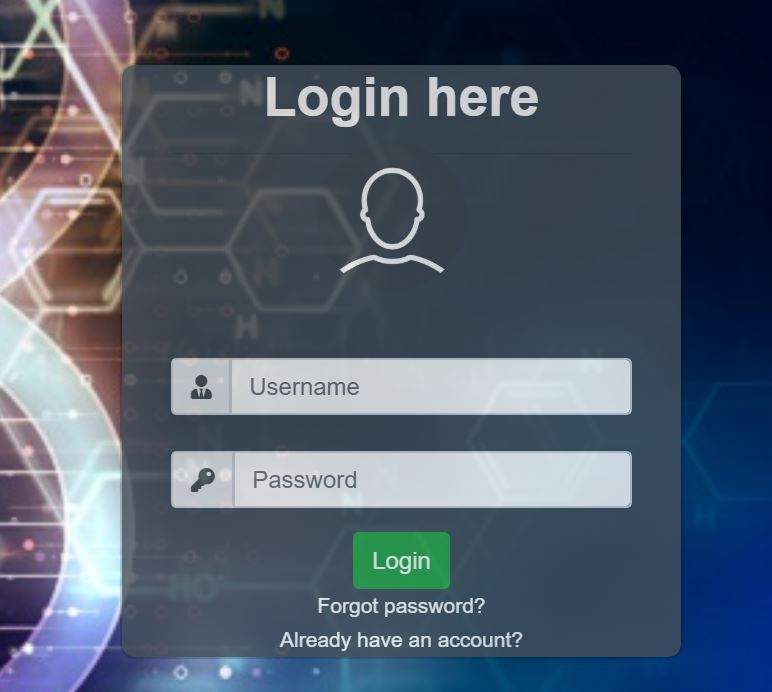
## **Navigation bar**



**Registration form**



## **Login form**



**Design Phase**

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Submitted to: Kiran Rana

Date: 20th Feb, 2019

# **Chapter 3: Design**

Design is logical and physical planning of the project and is the most crucial phase of project development. It implements the system based on user requirements and detailed analysis phase. And the purpose of design is to convert the requirements to a complete and detailed system design specifications.

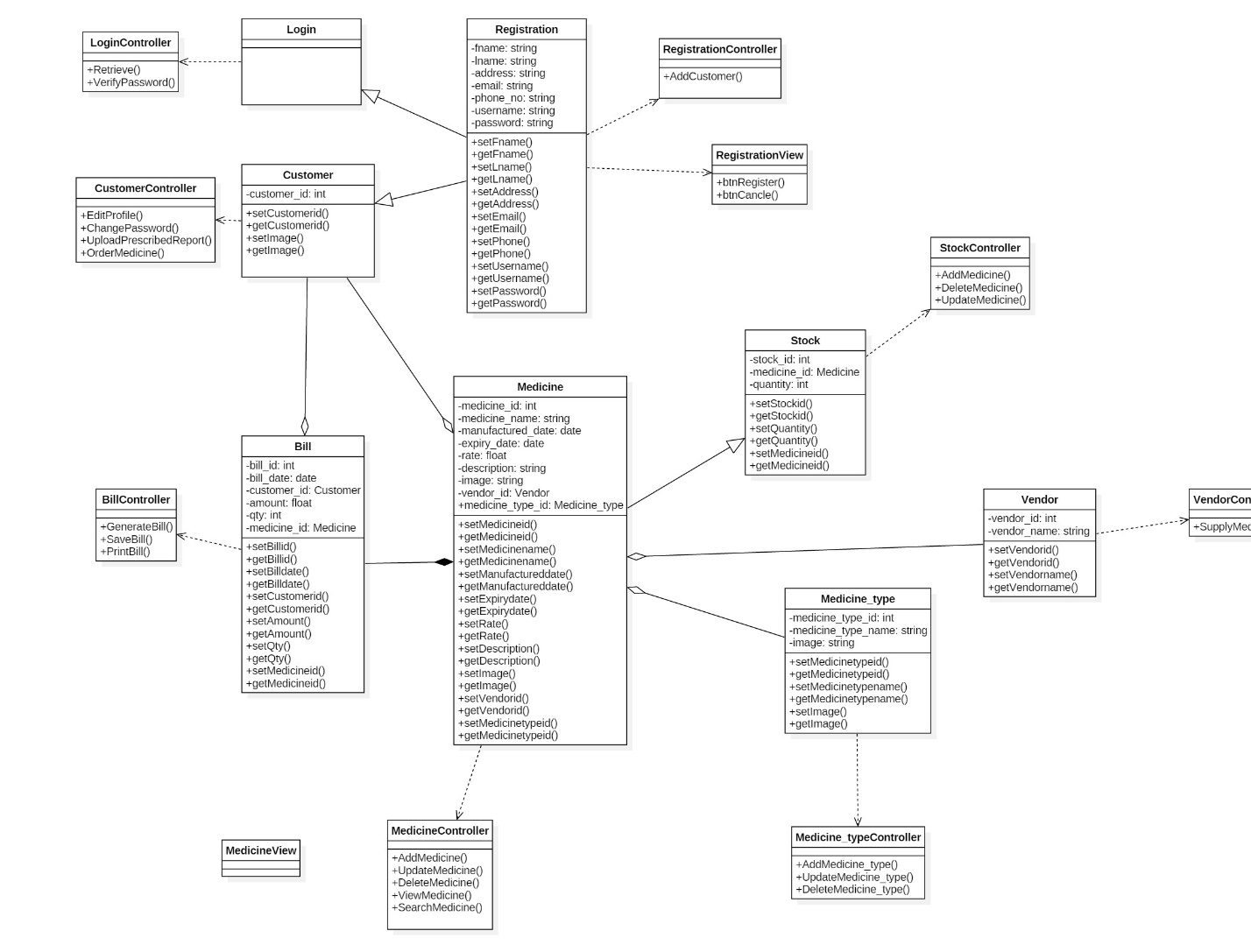
It includes structural and behavioral design for the development of the system.

# **3.1 Structural Design**

A design that concerns with the structure of the project and is illustrated as diagram. Class diagram and Sequential diagram are structured below.

## **Class Diagram**

Class diagram is static structure of the system modelling the system’s class, attributes, operations and the relationship between the objects (Lucitchart, 2019). It helps to describe the general overview of the system and provides base for data model.



Justification

* To model the static view of an application.
* Forward and reverse engineering.
* Describe responsibilities of a system.

Advantage

* Class diagram are simple and fast to read.
* It gives you a sense of orientation.
* They provide detailed insight into the structure of our systems.

Disadvantage

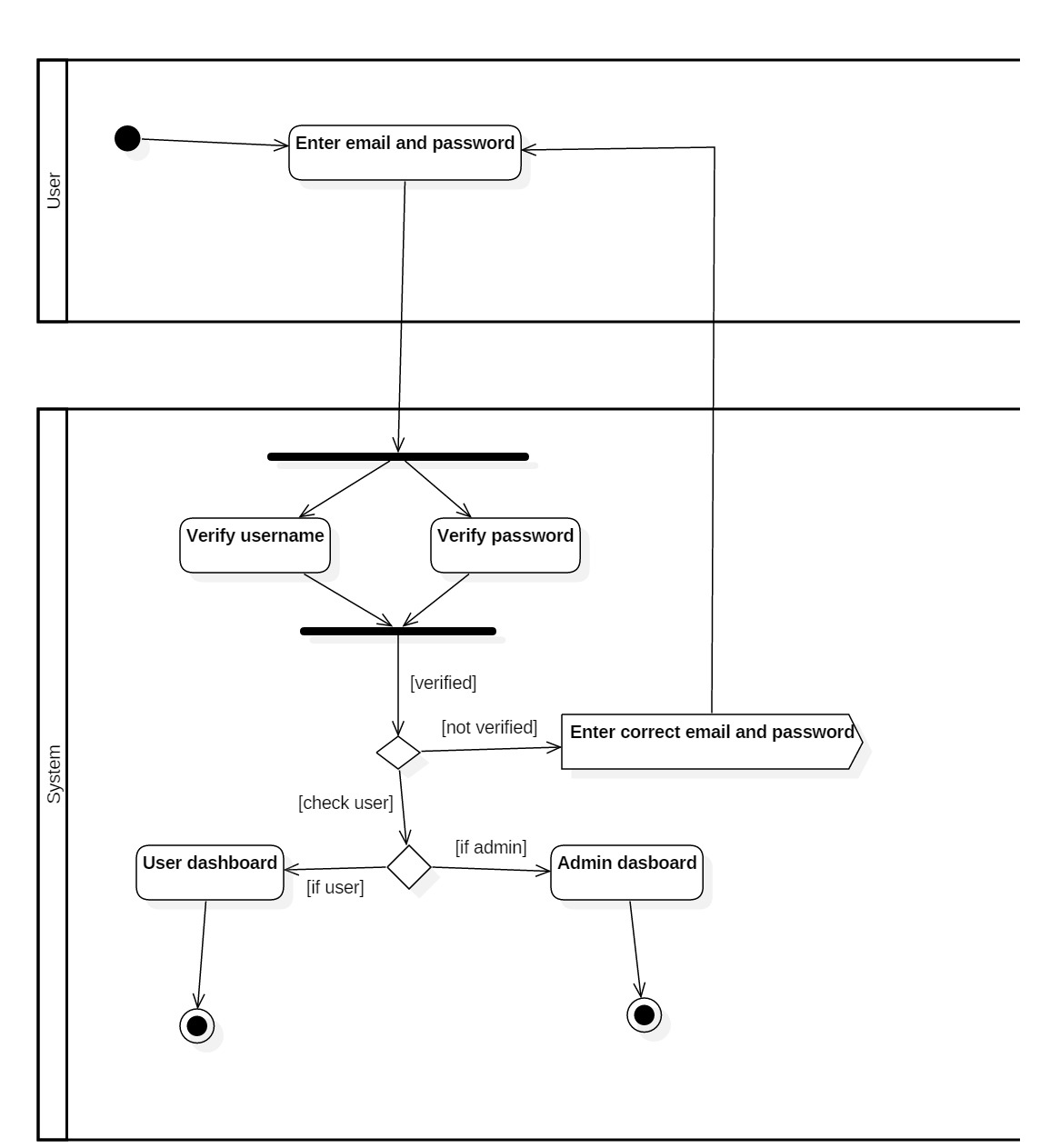
* They do not have dynamic model.
* It shows only collaboration among the elements of the static view.

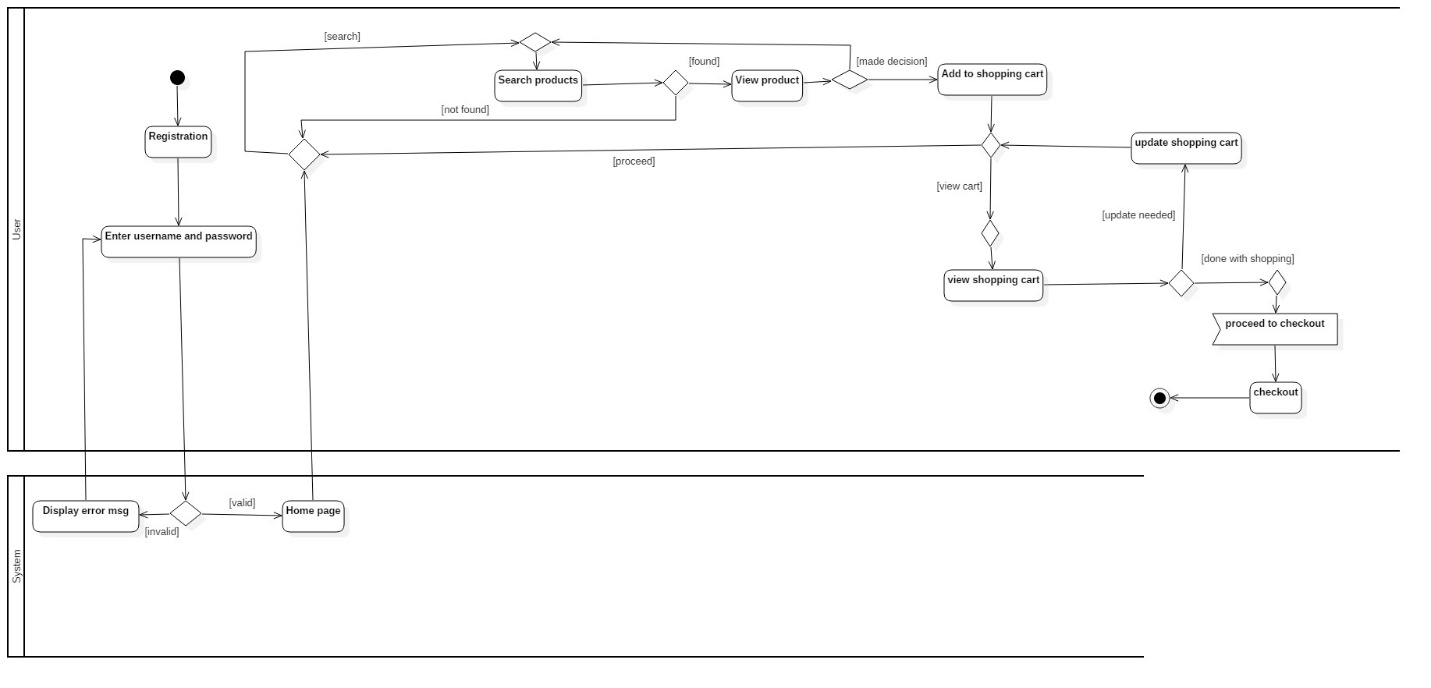
## **Sequence Diagram**

# **3.2 Behavioral Design**

A design which concerns with the behavior of the system and define its functionality through diagram. Activity diagram of the system is designed below.

## **Activity Diagram**





Justification

* To draw the activity flow of a system.
* To describe the sequence from one activity to another.
* To describe the parallel, branched and concurrent flow of the system

Advantage

* Since it is the most user-friendly diagram. So, generally regarded as an essential tool.
* It helps to display multiple conditions and actors within a work flow through the use of swim lanes.
* These diagrams are normally easily comprehensive for both analysts and stakeholder.

Disadvantage

* These diagrams can lead the over complex which might affect the user-friendly nature.
* These diagrams do not give the detail about how object behave or collaborate.

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## ER-diagram

It is related to data structure diagram which shows relationship between entities and elements of entities. It maps out the flow of information for a system.[(anonymous, 2018)](file:///C:\Users\Owner\Downloads\00167689_bibek_maharjan_CP.docx#_Chapter_7:_Conclusion:)



Justification

* To visualize database design ideas, we have a chance to identify the mistakes and design flaws, and to make correction before executing the changes in database.
* By visualizing a database schema with an ERD, we have a full picture of the entire database schema. You can easily locate entities, view their attributes and to identify the relationships they have with others.

Advantage

* It is very simple if we know relationship between entities and attributes.
* It is better visual representation.
* It is an effective communication tool for database designer.

Disadvantage

* It has limited constraints and specification.
* Information can be hidden in ER model.
* It is difficult to show data manipulation in ER model.

## Sequence diagram

