Software Requirement Specification

National COVID Management System (NCMS)

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1. Introduction

1.1 Purpose

The purpose of this document is to present a detailed description of the National COVID Management System (NCMS). It will explain the purpose and features of the system, the interfaces of the system, what the system will do, the constraints under which it must operate and how the system will react to the external stimuli. This document is intended to be proposed for both the stakeholders and the developers of the system.

1.2 Scope

The "National COVID Management System (NCMS)" is a software system which helps the Ministry of Health (MoH) of the particular country to immediately and efficiently manage the situation, as the COVID19 is spreading all over the world so fast.

Citizens who show COVID19 symptoms can register to the NCMS including his details like name, age, blood group, geolocation of the home. The system will search for hospitals with available beds and allocate a bed of the nearest hospital to the patient and inform the patient. At the same time patient details are visible to the hospital staff. So when a patient arrives as possible as doctors can get immediate action.

MoH authorities do the overall management of the healthcare system of the country. Considering the number of patients in the queue,if it exceeded the maximum count, MoH will lead to build new hospitals in the relevant district.

The application also has the capability of representing patient statistics including daily updates and overall status until then, with country level, district level and hospital level for both MoH and citizens. MoH authorities have the administration privileges. They are able to check hospitals and bed statistics also.

1.3 References

(1) http://ccftp.scu.edu.cn:8090/Download/b4994628-e3e2-450f-882b-488939cecf30.pdf
(2) https://qracorp.com/functional-vs-non-functional-requirements/
(3) https://www.scaledagileframework.com/nonfunctional-requirements/

1.4 Document Overview

The remainder of this document includes two chapters. The next chapter, the Overall Description section, of this document gives an overview of the functionality of the product. It describes the informal requirements and is used to establish a context for the technical requirements specification in the next chapter.

The third chapter, Requirements Specification section, of this document is written primarily for the developers and describes in technical terms the details of the functionality of the product and the different system interfaces.

Both sections of the document describe the same software product in its entirety.

2. Overall Description

This section gives an overview of the whole system. It explains how the system interacts with other systems and introduces the basic functionality of it. It describes how stakeholders can use the system with their privileges. At last, the design constraints and assumptions for the system are presented.

2.1 Product perspective

The system mainly consists of two parts : web application and the web server. The web application is used to view updated information of COVID19 in the country while the web server is managing base hospitals,new hospitals, patients and the whole system updates.

When a citizen shows COIVID19 symptoms, he should register to the NCMS system entering his/her details including his geo location.To get the location, the Geolocation settings should be enabled in the user's browser.

And in the system, it uses some messaging system to inform hospitals and patients. Patients will be informed with their serial number and hospital name with bed number or queue number in it. And the hospital will be informed with patient details at the same time.

Since this is a data-centric product, it needs a database to store the data. Both the web application and the server communicate with the database. All of the database communication will go over the Internet. When citizens enter their details, they are stored in the database. And admins can add/modify/remove data in the database.

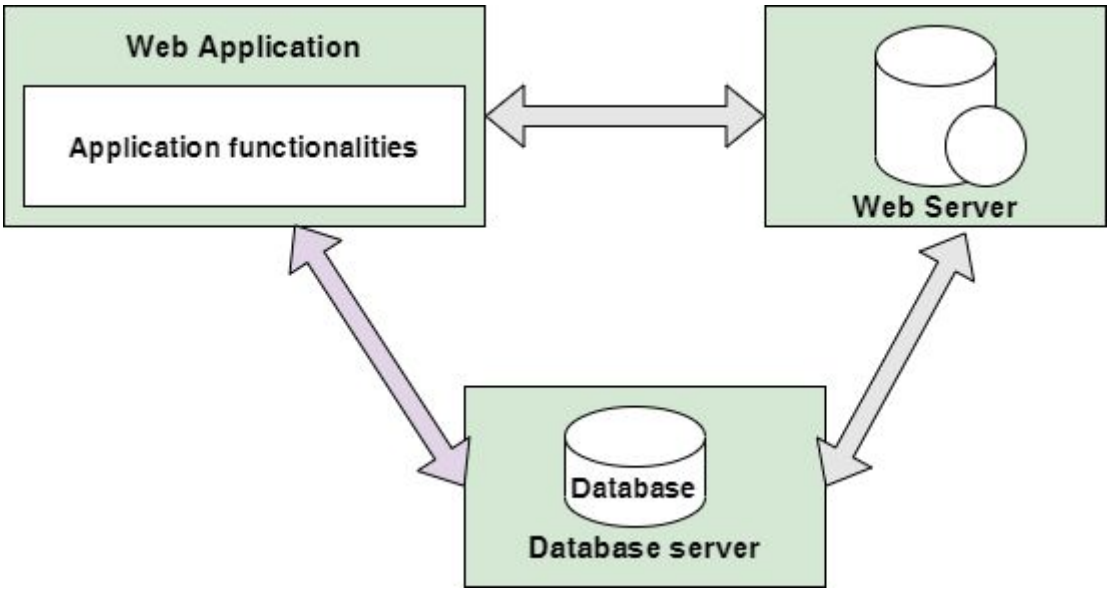


Figure 1: Block Diagram

2.2 Product functions

With this web application, the users will be able to view daily updates and overall status of COVID19 patients in the country. The result of the search will be viewed either in a list view or in a graphical view. It provides information at hospital level,district level and country level.

The result is based on the type of the user. If he is an administrative board(MoH), he is able to view hospital details like number of beds available in each hospital, number of patients in the queue. They have options to add new hospitals, assign serial numbers and queue numbers for registered patients. When a patient is assigned to a hospital MoH informs both patients and the selected hospital. By that patients are informed their serial number and hospital bed number or if they are in the queue then send them their queue number too. And send patient details to the particular hospital at the same time.

If the number of patients in the queue exceeds the maximum it will display a warning to MoH. When a patient is found recovered, after he is discharged, patient count is updated.

2.3 User characteristics

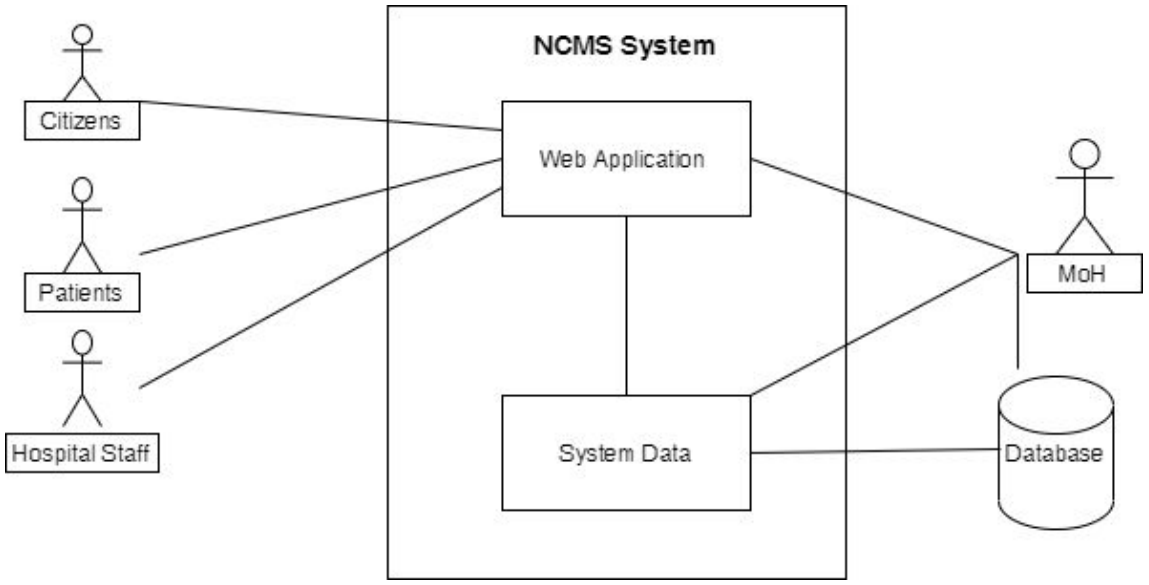


Figure 2: System Environment

The system has four active actors that interact with the system. Each of these four types of users has different use of the system so each of them has their own requirements.

Citizens,patients,hospital staff and MoH can view daily updates and overall status of COVID19 including the details of hospital level, district level and country level.

And citizens who have COVID19 symptoms can register into the system here.

Directors of the hospital can remove patients when they are recommended to discharge.

MoH is the actor who has administrative privileges. He can access the whole system with the database. MoH can edit the system details like adding hospitals, adding hospital directors, check hospitals and bed statistics..etc. As they are managing the overall system so there is no incorrect information within it.

2.3 Design and Implementation Constraints

The Internet connection is one constraint for the application. Since the application fetches data from the database over the Internet, it is crucial that there is an Internet connection for the application to function.

Both the server and the web application will be constrained by the capacity of the database. Since the database is shared between both applications it may be forced to queue incoming requests and therefore increase the time it takes to fetch data.

2.4 Assumptions and Dependencies

One assumption about the product is that it is always used on the internet to work properly. If there is not enough internet facility, the application does not work as intended.

For every citizen who is registered to the system will allocate a bed in the nearest hospital. Therefore there is an assumption that only citizens who have COVID19 symptoms will register to the system.

Another assumption is about location. For that the geolocation settings in the web browser should be enabled. Otherwise the user cannot get the location coordinates.

3. Requirement Specification

3.1 External Interface Requirements

3.1.1 User Interfaces

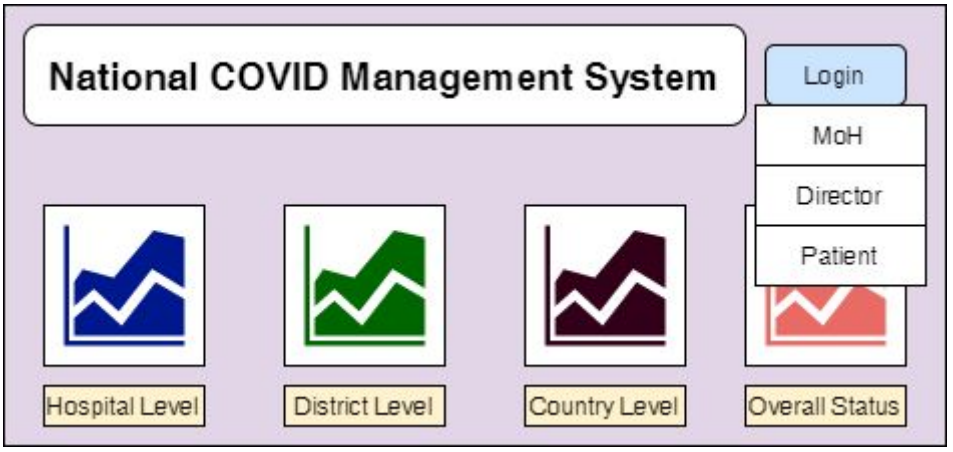


Figure 3: Home page

Figure 4: Login page

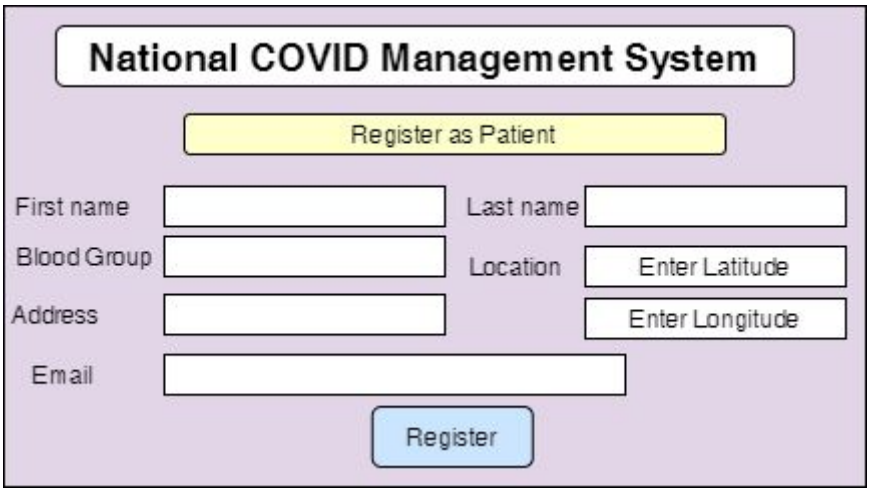


Figure 5: Patient Registration page

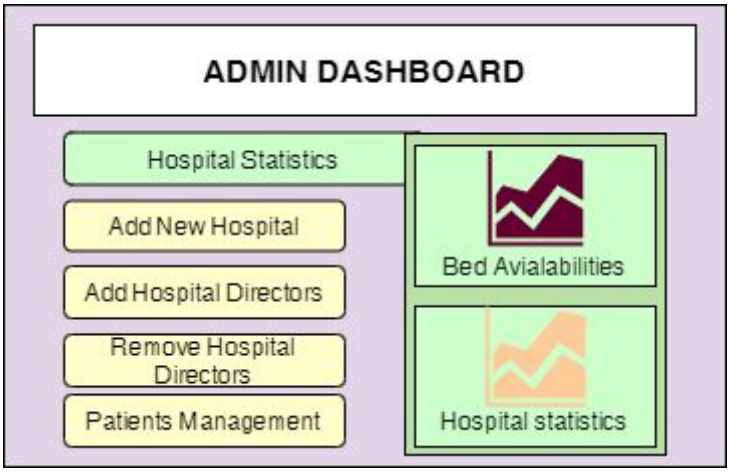


Figure 6: Admin Dashboard

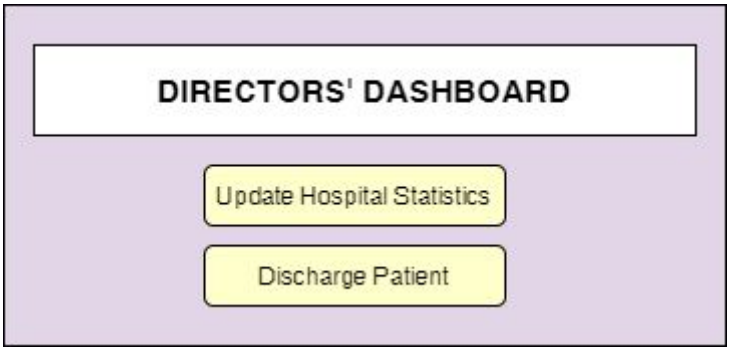


Figure 7: Hospital Director Dashboard

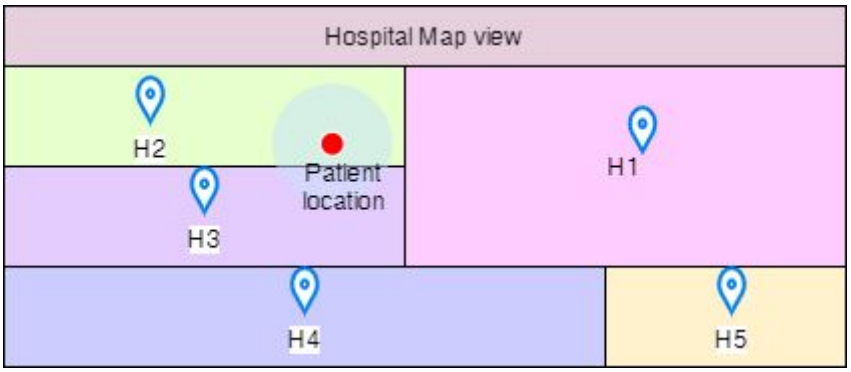


Figure 8: Hospital location view

Every user can see the Home page like in figure 3 when he/she opens the application. It displays patients statistics to all in district level, hospital level and country level with overall status.

In figure 4, the login page is displayed. Users can login as a patient, MoH or Director. When a patient is successfully registered to the system.Then they can login to the system successfully. And also other users MoH admins and directors also should login to the system to get active their functionalities. They no need to register to the system as they are added to the system by MoH admin.

NCMS system is used to manage citizens only who show COIVD-19 symptoms. So they should register to the system by entering required details using the registration page. (Figure 5)

In figure 6, it shows admins dashboard. When a user logs into the system only admins visible this page. MoH authorities the user who has administrative privileges. They can view daily updates of patient statistics, as well as hospital statistics like bed availabilities, patient count in the queue.

In figure 7, it is the page that opens when a director of a hospital logs into the system. MoH allocates patients into hospitals, but when he is recovered doctors can discharge them. They are able to delete patients from the list and update hospital availability.

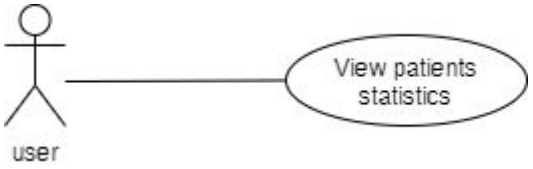
Figure 8 displays location of hospitals and location of each patient. It helps MoH to assign patients into the nearest hospital. When new hospitals are built in addition to base hospitals, they are also added into the map.

3.2 Functional Requirements

This section outlines the use cases for each of the active users separately including the requirements that specify all the fundamental actions of the software system.

3.2.1 Users Use case

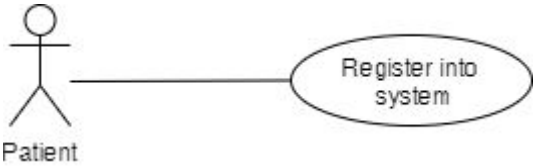
Use case: View patients statistics
Diagram:



Description: Every user(citizens, patients, MoH, Hospital Staff) can open the application using any web browser. When once open the web page it displays patients statistics and overall status in the country to the users. Everyone can see those without login to the system.

3.2.2 Patient Use case

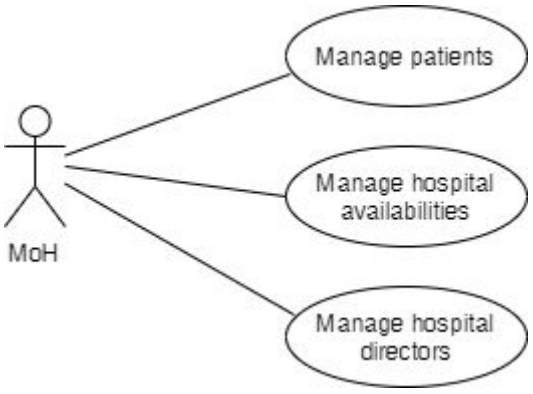
Use case: Register into system
Diagram:



Description: Patients can register to the system by providing required details in the registration page. After to view more details they can log into the system using their username and password.(Everyone who is registered to the system are considered as a patient)

3.2.3 MoH Use case

MoH has following set of use cases:



Manage patient use cases

Use case: Allocate patients into hospital
Description: When a patient is registered to the system, MoH will allocate a bed to the patient from the nearest hospital considering his location coordinates and bed availability.

Use case: Assign patients into queue
Description: If there are no available beds in the nearest hospital, a patient is put into the queue until bed is available by giving them a queue number in addition to the serial number.

Use case: Inform patient with hospital details
Description: When a patient is registered, a bed will be allocated for him. Then the patient will be informed with his serial number, bed number and hospital name. If bed is not available they are sent to the queue and informed his queue number with the same details.

Manage hospital use cases

Use case: Check hospitals and bed statistics
Description: MoH checks bed availabilities in each hospital before allocating patients into particular hospitals. If beds are not available at that moment, assign patients into the queue.

Use case: Add new hospitals into system

Description: When considering a hospital, if the number of patients in the queue exceeds the maximum limit , then MoH takes action to build a new hospital. Then add them into the system.

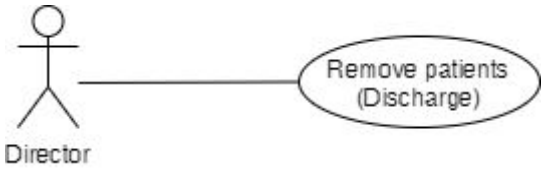
Manage Hospital Directors(Chief doctor) use cases

Use case: Add hospital directors into system
Descriptions: Each hospital has a director.(Chief doctor). They are added to the system by MoH.(Therefore directors no need to register to the system.They can work on the system by only login.)

Use case: Inform with patient details
Description: When a patient is allocated to a hospital,at the same time details of the patient will inform hospital staff. Then hospital staff can be ready for treatments when a patient arrives.

3.2.4 Directors' use case

Use case: Remove patients
Diagram:



Description: Hospital directors can discharge patients who are discovered as recovered. That means the patient is removed from the list.

3.3 Non-functional Requirements

- **Reliability**

Description: The reliability that the system gives the right result on showing statistics of patients, bed availability etc.

- **Availability**

Description: The availability of the system when it is used without considering network failures.

- **Security**

Description: Security systems need database storage just like many other applications. Users data like passoword is encrypted.

- **Correctness**

Description: Administration manages the system and visible correct updates. Users are redirected into correct web pages.