
Software Requirements Specification

for

Coronary heart disease diagnosis system

Version 1.0 approved

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GROUP COMPOSITION

Table 1: Table showing group composition

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Revision History

Table 2: Revision History Table

Name	Date	Reason For Changes	Version
BSSE22-27	6 th December, 2022	Initial Version	Version 1.0

1. Introduction

1.1 Purpose

This document is the first release that elaborates the requirements of “Coronary Heart Disease Diagnosing” (**CHDD**) system. This system is specifically developed for doctors to aid them in the process of diagnosing coronary heart disease basing on the different risk assessment variables that are indicators of the disease. [1]

This document contains the overall description of **CHDD**, its external interface requirements, system features and nonfunctional requirements that are expected to be implemented by the developers.[2]

1.2 Document Conventions

To make this **SRS** more readable and effective, it is written using font style of times new roman, font size of 12pt for paragraphs, 14pt for heading 2, 18pt for heading 1,1.5 line spacing used and all headings are bold.

1.3 Intended Audience and Reading Suggestions

The intended audience of this document are current and future developers working on “Coronary heart disease diagnosis system” ,the testers, the project coordinator, the maintenance engineers and Uganda Heart Institute (UHI) staff.

Below is the table showing intended users of this SRS document and reasons why they are suggested to read this document.

Table 3: Table Showing the intended system users and reason why

Intended User	Reason
Developers	Use it as a guide while developing the software
Testers	To ensure that the system meets the requirements of the

	intended users
Project coordinator	To check the progress of the project.
Maintenance engineers	To understand the structure of the system so as to ease their maintenance work
UHI Staff	To understand how the software works and ensure that it is usable.

1.4 Product Scope

Coronary heart diagnosis system is a web application that will take risk assessment variables as its input, analyse them to find out whether there is presence of coronary heart disease.

1.4.1 Goal

To develop the **CHDD** system that will diagnose the presence of coronary heart disease, provide graphical analysis about spread of the disease, keep track of patients' results and notify patients diagnosed of the disease about the next checkup.

1.4.2 Objectives

- i. To design and implement **CHDD** system basing on its requirements.
- ii. To test **CHDD** system to ensure that it meets its requirements.
- iii. To deploy and maintain **CHDD** system so that it can be accessed by its intended users.

1.4.3 Benefits

- i. Doctors will be able to diagnose the presence of coronary heart disease in a short time.
- ii. The system will notify patients diagnosed with the disease about the next checkup.
- iii. The system will provide graphical analysis about the spread of the disease.

1.5 References

- [1] NHS, "Coronary Heart Disease," NHS-UK, 10 March 2020. [Online]. Available: <https://www.nhs.uk/conditions/coronary-heart-disease/diagnosis/> [Accessed 6 December 2022]
- [2] Charles Lane and Nico Kruger, "How to Write a Software Requirements Specification," Perforce, 16 December, 2021. [Online]. Available: <https://www.perforce.com/blog/alm/how-write-software-requirements-specification-srs-document> [Accessed 5 December 2022].
- [3] Bill Basener. "Coronary Heart Disease Dataset," Kaggle 2020. [Online]. Available: <https://www.kaggle.com/datasets/billbasener/coronary-heart-disease?resource=download> [Accessed 17 December 2022]

2. Overall Description

2.1 Product Perspective

CHDD system is a new product. It is a web based application.

Over the years, diagnosing CHD has been a challenge because it is a hard exercise and evenly requires higher-level experience and machinery. This web software that will be accessed everywhere comes to address these issue which will reduce the costs of diagnosis in the long run.

2.2 Product Functions

- i. CHDR001 Coronary heart disease diagnosis system shall allow Doctors to predict the presence of coronary heart disease.
- ii. CHDR002 Coronary heart disease diagnosis system shall provide graphical analysis about the spread of the disease.
- iii. CHDR003 Coronary heart disease diagnosis system shall notify Patients diagnosed with coronary heart disease about the next checkup.
- iv. CHDR004 Coronary heart disease diagnosing system shall keep track of patient's records.

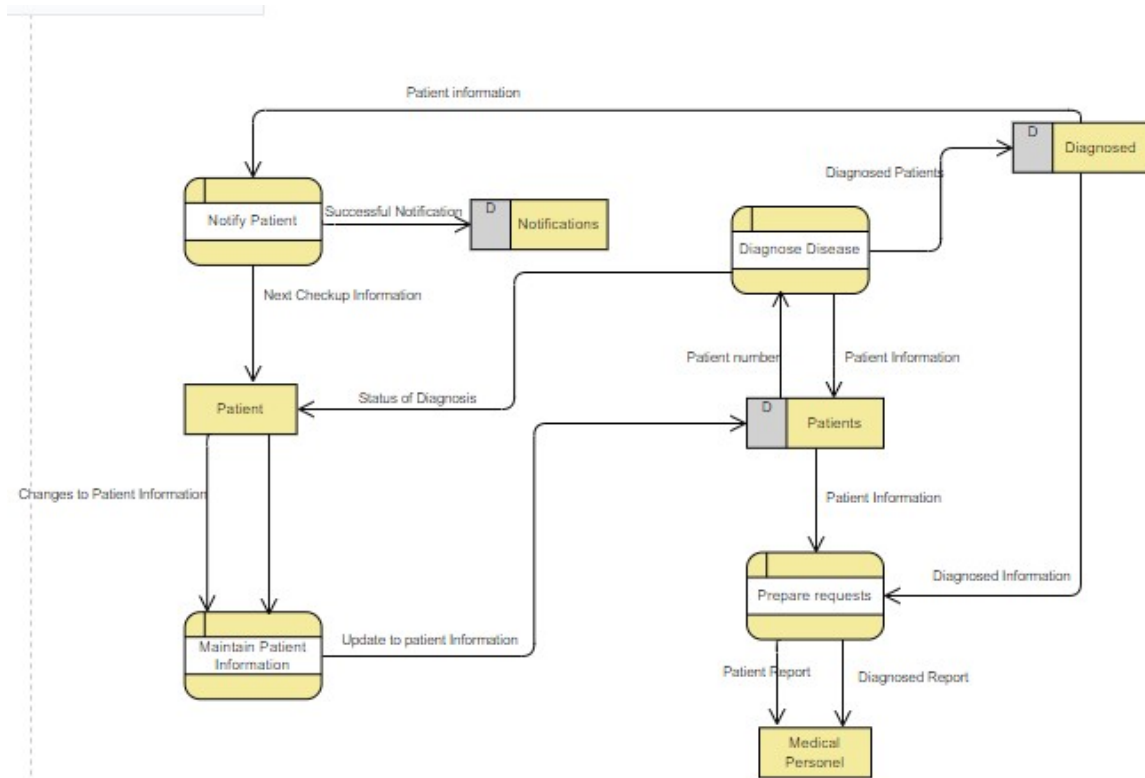


Figure 2.1: CHDD system Level 1 DFD

2.3 User Classes and Characteristics

Medical personnel

These diagnose and treat coronary heart disease. They are expected to have an educational and proficiency level in medicine and surgery.

Coronary Heart Disease Patients:

These are individuals that go for checkup. They don't necessarily need to have an educational level to use the system.

Admin:

These are individuals who are expected to be having a technical expertise in computing. They create, update and delete user accounts.

2.4 Operating Environment

The System will operate on a smart phone, a computer with either windows, Mac or Linux operating Systems. Common browsers like Google chrome, safari, Mozilla fire fox etc., must be installed on the computers. The system will use a graphical user interface for easy navigation by the novice user.

2.5 Design and Implementation Constraints

- The coronary heart disease application back end will be deployed on an online server which will require hard drive size of about 100GB for storing training data and user accounts.
- The results after processing the risk variables will be produced in less than 10 seconds. Other computations involved will last less than 5 seconds given the network and all other hardware components are correctly functioning.
- The database to hold the application's data will be deployed on a remote server to reduce the application size and rapid increase of the application's size.
- The application is required to run on both mobile phones and computers.

Language requirements;

English will be the main language used in the application.

Communications protocols;

HTTPS and FTPS are the main communication protocols to be used when sending requests, receiving requests, sending and receiving files in both the mobile and web applications.

Security considerations;

User data such as user profile, user test results and Training data will be highly guarded from unauthorized access since its sensitive.

2.6 User Documentation

User manual will be available on the application's website.

For every page of the doctor, a link to online documentation manual explaining how to use the system shall be provided.

2.7 Assumptions and Dependencies

The CHDD system will be trained using a data set of coronary heart disease risk assessment variables from Kaggle and it is assumed that those variables are indeed accurate and correct.[3]

3. External Interface Requirements

3.1 User Interfaces

A first time user that is to say the doctors and admins of the system will be required to create an account in order to access the key features of the system. Already registered members shall be able to login to the system using their credentials. Once the doctor or admin has been granted access to the system he or she shall be able to access the respective home page.

The home page shall have a dashboard with a number of buttons each possessing a key feature of the system. Once a user clicks on any of the buttons that is to say, diagnose CHD , view graphical analysis, and send notification this will redirect him or her to the respective pages.

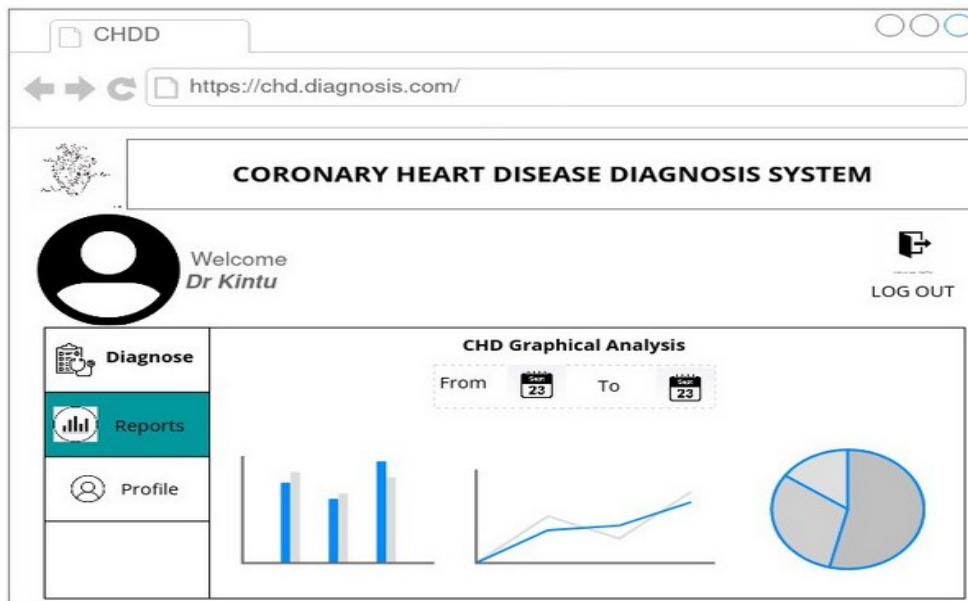


Figure 3.1: Analysis page GUI mock up

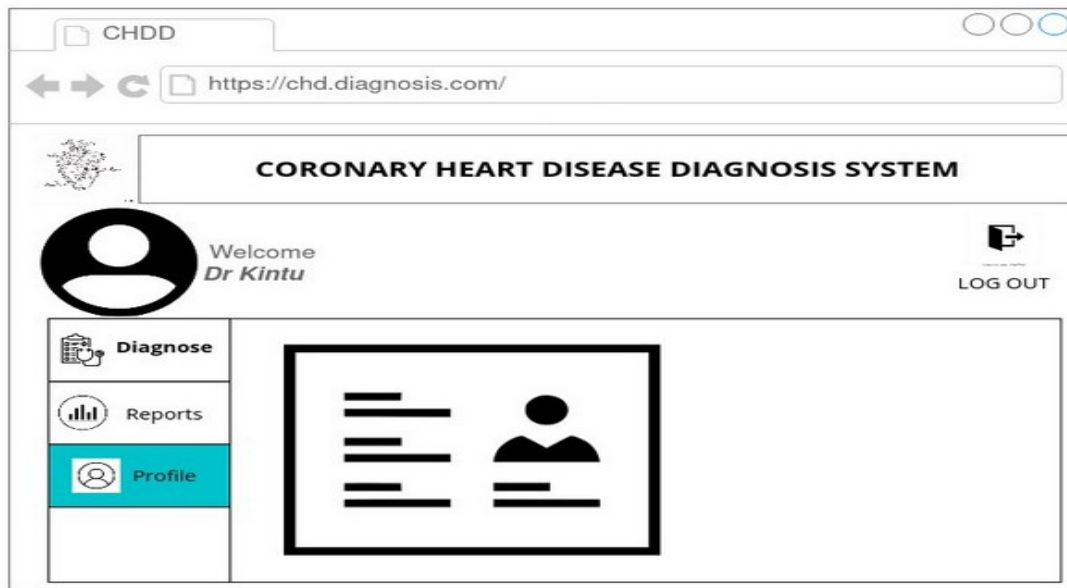


Figure 3.2: Profile page GUI mock up

3.2 Hardware Interfaces

The Coronary heart disease diagnosis system shall be able run on devices such as desktop, computers, laptops and tablets.

The system user interface will be able to resize depending on the size of the device used to ensure a better user experience during navigation.

3.3 Software Interfaces

The Coronary heart disease diagnosis system shall be able to interact with the MySQL database when it comes to logging in, storing the details of the patients and accounts of the doctors.

A number of python libraries shall be used during the implementation of the backend of the system.

Due to the high processing power, storage, and RAM required during the training of the prediction model, an online platform shall be used to ensure efficiency of the application during prediction.

The system shall be accessed on computers running windows operating system, Mac operating system, and Linux operating system. Being a web application, the system shall be accessed through web browsers such as Mozilla Firefox, Google Chrome, Internet Explorer, and Safari.

3.4 Communications Interfaces

Being a web application the system shall be accessed through HTTP from anywhere using an internet connection. Emails shall be used in order to remind patients of their next checkups and also to contact the medical specialists. Secure Socket Layer (SSL) shall be used in order to ensure integrity of the patients' data transferred online.

4. System Features

A use case diagram of the coronary heart disease diagnosis system:

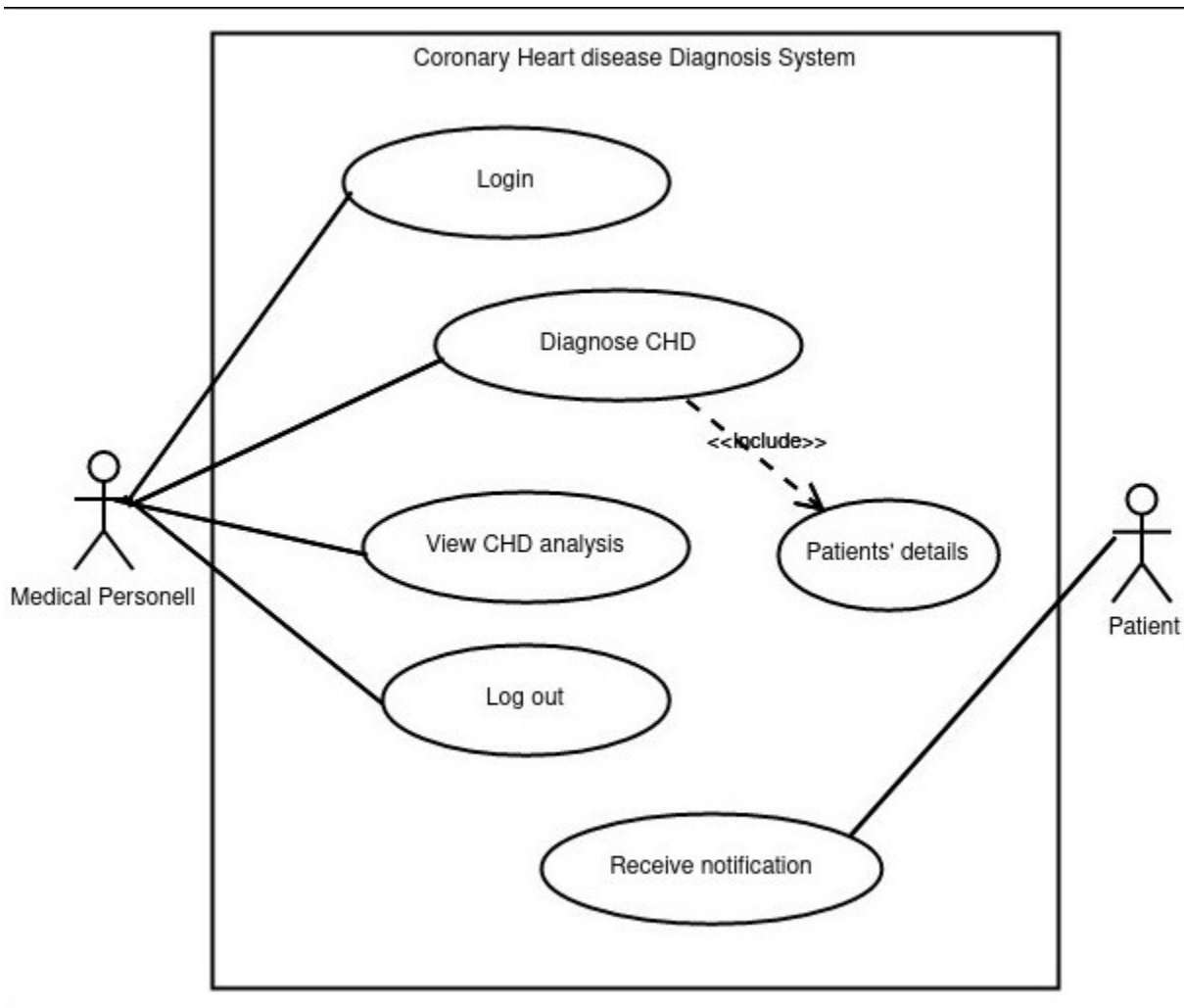


Figure 4.1: A use case diagram of the coronary heart disease diagnosis system

4.1 Diagnose CHD

4.2.1 Description and Priority

The purpose of this feature is to allow doctors to diagnose the presence of coronary heart disease. It is of high priority.

4.2.2 Response Sequences

Table 4: Use case narrative of the Diagnose function

Use Case Diagram	Coronary Heart Disease Diagnosis system use case diagram
Use case ID	CHDR001
Priority	High
Primary Actor	Medical personnel
Secondary actors	None
Goal in context	To diagnose a patient with CHD using the risk assessment variables.
Precondition	The user must be logged in the system
Trigger	The process starts when the doctor has suspected presence of CHD in a patient and logs in the system to diagnose the disease.
Normal flow	<ol style="list-style-type: none">1. The Doctor clicks Diagnose menu option2. The doctor Fills in Patient's name, email and telephone number.3. The Doctor fills in the risk assessment variables.4. The Doctor clicks Finish Diagnosis button5. The system displays the results6. The system will prompt a message box, asking the Doctor whether to save or cancel7. The system shall save the patient's details.

Exception	8. If user is not logged in, they are redirected to log in page 9. If some compulsory variables are missing, an error message is displayed. 10. If cancel button is clicked, system does not save patient's record.
Frequency of use	Everyday
Post-condition	Patient details will be saved in the database

4.2.3 Functional Requirements

REQ-1: The system shall provide fields for patient's name, email and telephone number.

REQ-2: The system shall provide fields for filling in the risk assessment variables

REQ-3: The system shall provide a Finish Diagnosis button

REQ-4: The system shall display the results

REQ-5: The system shall record patient's details.

4.2 View Coronary Heart Disease Analysis

4.2.1 Description and Priority

The purpose of this feature it to allow doctors to view the graphical analysis of coronary heart disease It is of medium priority.

4.2.2 Stimulus/Response Sequences

Table 5: View CHD analysis use case narrative

Use Case Diagram	Coronary Heart Disease Diagnosis system use case diagram
Use case ID	CHDR002

Priority	Medium
Primary Actor	Medical personnel
Secondary actors	None
Goal in context	To make analysis basing on the previous patients diagnosed.
Precondition	11. The user must be logged in the system 12. The system must have records of all patients diagnosed
Trigger	The process starts when the user wants to analyse the spread of the disease for a given period.
Normal flow	13. The Doctor clicks view analysis menu option 14. The Doctors chooses the range of period for the required report. 15. The system displays the graphical analysis about spread of the disease.
Exception	16. If user is not logged in, they are redirected to log in page 17. If the period range is not selected, an error message is displayed.
Post-condition	The graphical analysis about the spread of the disease is displayed

4.2.3 Functional Requirements

REQ-1: The system shall provide field for choosing a range of period.

REQ-2: The system shall display the graphical analysis.

4.3 Receive Notification

4.3.1 Description and Priority

The purpose of this feature it to allow patients, who were diagnosed of coronary heart disease to receive notifications about the next checkup.

4.3.2 Stimulus/Response Sequences

Table 6: Receive notification use case narrative

Use Case Diagram	Coronary Heart Disease Diagnosis system use case diagram
Use case ID	CHDR003
Priority	Medium
Primary Actor	Medical personnel
Secondary actors	Patient
Goal in context	To notify the patient about next check up in case its needed
Precondition	The patient must have an email address. The next check up date must have been filled by the doctor.
Trigger	The process is automatic and happens only when next check is necessary as predetermined by the doctor.
Normal flow	18. The doctor fills in the patients details including the email 19. If another check up is required, the next check up date is input. 20. The system notifies the patient via email.
Exception	If no next check up date is filled, the patient does not receive any notification.
Post-condition	Patient receives a notification reminder about the next check up

4.3.3 Functional Requirements

REQ-1: The system shall automatically send notifications to patients.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

The time taken from inputting the risk assessment variables from the local computer to the cloud for processing to time of receiving the results from the cloud should be less than 30 seconds.

5.2 Safety Requirements

The System will provide warning message before the user takes critical actions.

5.3 Security Requirements

- i.* The coronary heart diagnosis system will ensure data integrity whereby user data and records will be protected from unauthorized modification of the data.
- ii.* The coronary heart diagnosis system will be protected from DDOS attacks to increase availability of the system to the right system users.

5.4 Software Quality Attributes

- i.* The coronary heart disease diagnosis system will have distinct icons for easy usage.
- ii.* The coronary heart disease diagnosis system will be easy to maintain by the developers, as the code will be well structured and documented.
- iii.* The coronary heart disease diagnosis system will be flexible as it will be accessed using personal computers, desktop computers and mobile phones.

5.5 Business Rules

- i.* The user shall be required to have an account so as to use the system.
- ii.* User login details must match.

6. Other Requirements

- i. A stable internet connection of about 0.8Mbps and above will be required to access the coronary heart disease system.

Appendix A: Glossary

Table 7: Meaning of abbreviations used in the report

Acronyms and Abbreviations	Meaning
CHD	Coronary Heart Disease
CHDD	Coronary Heart Disease Diagnosis
DDOS	Distributed Denial of service
GB	Giga Bytes
HTTPS	Hyper Text Transfer Protocol Secure
RAM	Random Access Memory
SRS	Software Requirements Specification
UHI	Uganda Heart Institute