Software Requirements Specification

for

Recona

Analysis of cell composition from tissue expression profiles and identification of infection with lynch syndrome

Version 1.0

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Revision History

Name	Date	Reason For Changes	Version

1. Introduction

1.1 Purpose

The Software Requirements Specification document contains the complete Software requirements for the recona website system and describes the design decisions, Architectural design, and the detailed design needed to implement the system, it provides visibility in the design and provides the information needed to implement new reliable software. It sets out the framework that all the development teams will follow. It provides critical information to all the teams, including development, operations, quality assurance, (QA), and maintenance, ensuring the teams agree, the SRS will be used by all development teams and stakeholders to test and check if the system meets their requirements.

1.2 Document Conventions

The document is prepared using Microsoft Word 2016 and has used the font type 'Calibri'. The fixed font size that has been used to type this document is 13pt with 1.0 line spacing. It has used the bold property to set the headings of the document.

1.3 Intended Audience and Reading Suggestions

The intended audience of this document would be the end users of the website (Doctors and Bioinformaticians) and will be used by all the development teams including developers, testers, quality assurance (QA), and maintenance.
A brief outline of the document is,

a) Overall Description
b) System Features
c) External Interface Requirements
d) Non-Functional Requirements

1.4 Product Scope

Recona mainly is a website that identifies the cellular composition of tissues and chromosomes for cells to help doctors detect Lynch syndrome. People with this syndrome are at risk of developing various types of cancers, they are advised that early identification will significantly speed up treatment and reduce risk.
Users of recona can access the platform anytime, anywhere, and receive fast and meticulous service. The website will serve all doctors, bioinformaticians, and

bioinformatics students. the main scope is to identify the cellular composition of tissues and chromosomes and detect lynch syndrome mutation.

1.5 References

- https://scholar.google.com.eg/scholar?as_ylo=2022&q=lynch+syndrome&hl=ar&as_sdt=0,5
- https://www.hopkinsmedicine.org/health/conditions-and-diseases/lynch-syndrome
- https://link.springer.com/article/10.1186/s40164-021-00231-4#Sec24

2. Overall Description

2.1 Product Perspective

The website serves anyone with an interest in what it offers including clinicians, bioinformaticians, and researchers. The website will provide better options for users to search and manipulate their sequence so that they can know the type of tissue they are working on, know the chromosome and discover if the owner of the genetic sequence has Lynch syndrome. This genetic disorder increases the risk of many types of cancer, especially colon cancer and endometrial cancer. Thus, predicting a patient's risk of developing these cancers is possible.

2.2 Product Functions

User

- Sign up or log in
- Upload
- Download
- History
- About
- Researches

2.3 User Classes and Characteristics

User: -

They will sign up on the website and can upload the sequence of the patient then enter the name of the project and press "ok" then he/she will get the result and type of tissue to detect whether the patient has Lynch Syndrome or not.

They also can see their history of searches (files that they uploaded before)
They can test the website via press "Download" to download the demo file and then pressing "ok", they will upload this file on the website to detect whether the patient has Lynch Syndrome or not

2.4 Operating Environment

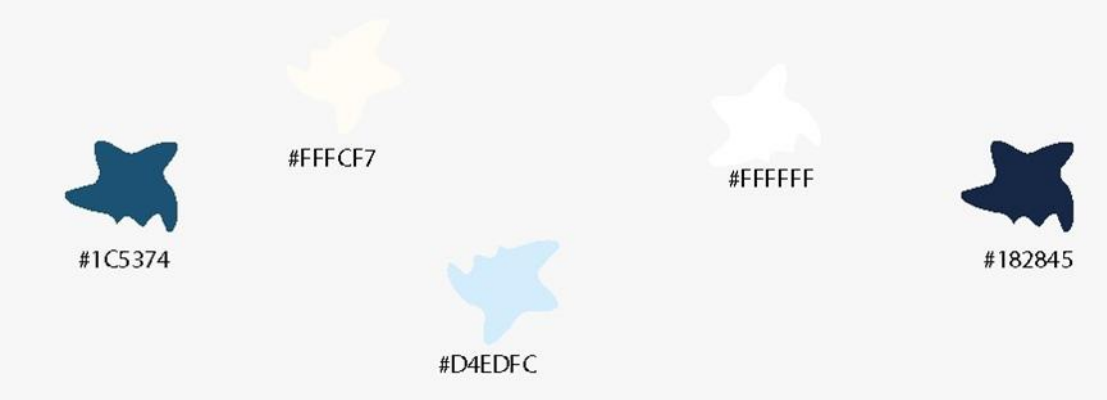
OS: any operating system

Web development:

- Back end (deep learning with Django)
- Front end

2.5 Design and Implementation Constraints

- Language used is a python
- The color of the user interface will be

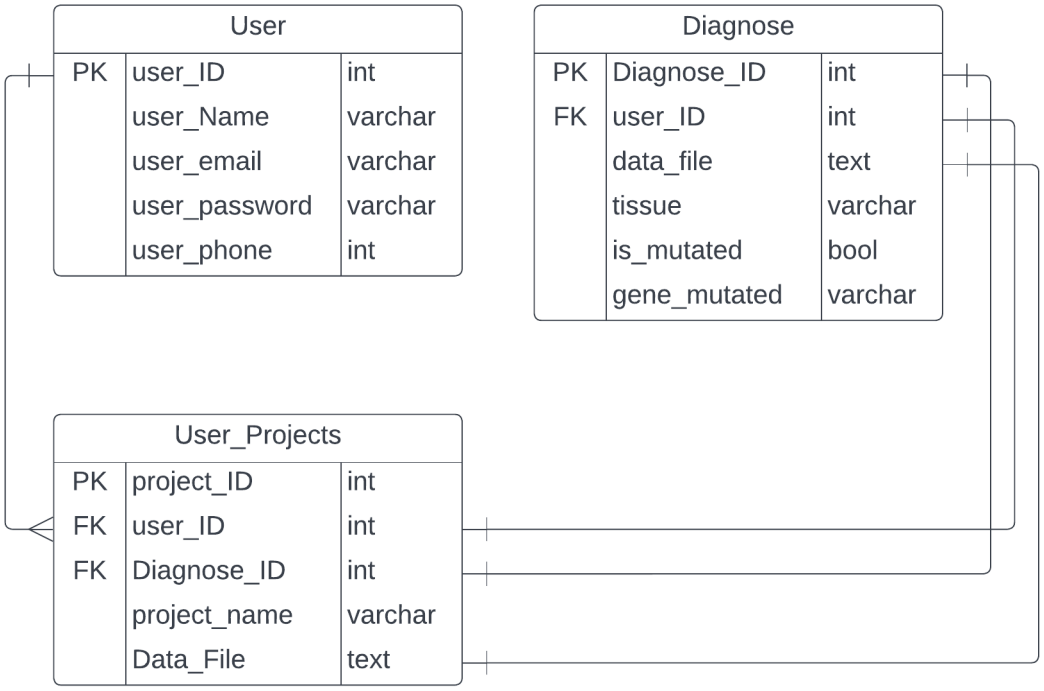


3. User Interface Requirements

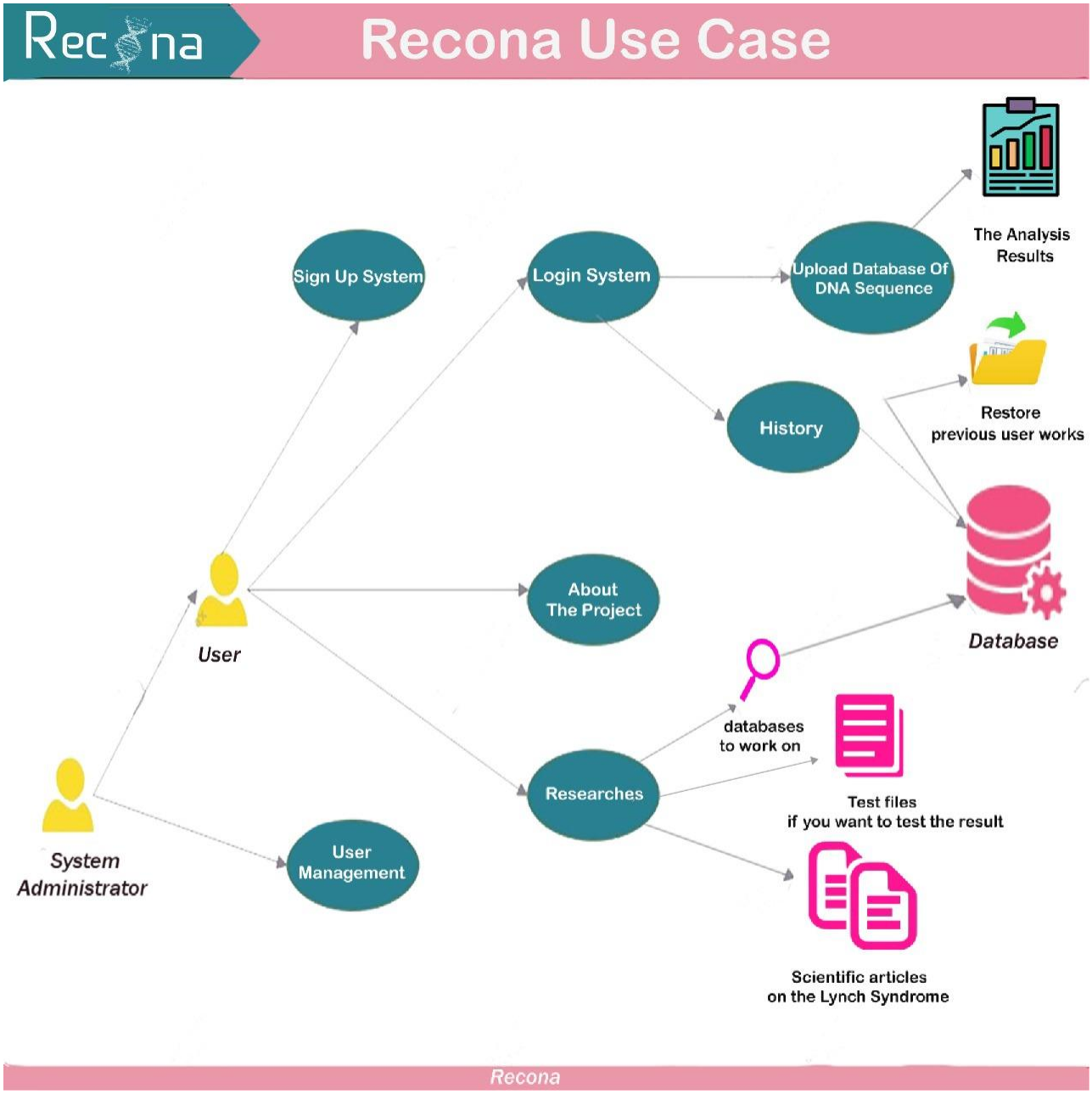
https://www.figma.com/proto/oT8TXTfzPdFdBE8edMTdmj/Graduation-project?page-id=0%3A1&node-id=3%3A2&viewport=-2274%2C1375%2C0.5&scaling=scale-down&starting-point-node-id=3%3A2

4. System Features

4.1 Entity Relationship Diagram (ERD)



4.2 Use Case Diagram



4.3 Use case scenarios

Use case name	Log in	UC-ID	1	Priority	High
Actor	User (Bioinformatician or Researcher in the medical field)				
Goal	To enter on Recona site to use its feature				
Pre-condition	Connect with the internet, Open the Recona site, and enter your data (username and password)				
Normal course	1. Open Recona site 2. show the home page 3. click on the login bar 4. show the login page 5. enter your data like username and password 6. click on the login button, now log in successfully				
Post-condition	Access successfully the upload page to upload a file of DNA-sequence				

Use case name	Register	UC-ID	2	Priority	High
Actor	User (Bioinformatician or Researcher in the medical field)				
Goal	Register on theRecona site				
Pre-condition	Connect with the internet and Open Recona site				
Normal course	1. Open Recona site 2. show the home page 3. click on the login bar 4. show the login page 5. click on register to register on the recona site 6. enter your data like First name, Last name, email, password, and confirm the password 7. click on the signup button, and register successfully show the upload page				
Post-condition	You are registered on the recona site successfully and show the upload page				

Use case name	Upload	UC-ID	3	Priority	High
Actor	User (Bioinformatician or Researcher in the medical field)				
Goal	To upload a file of DNA-sequence to the Recona site for data analysis				
Pre-condition	Register on the recona site and upload a file of the DNA-sequence				
Normal course	1. Open Recona site 2. show the home page 3. click on the login bar 4. show the login page 5. enter your data like username and password 6. click on the login button, now log in successfully 7. show the upload page 8. click on the upload button 9. enter the name of case/project 10. attach the file from your PC 11. Click on the start button 12. wait a few minutes for the result of the analysis to view				
Post-condition	The file was uploaded successfully, and data analysis was done to know if there is infected with lynch syndrome or not and the type of tissue Save your transactions successfully in your profile history				

Use case name	Log out	UC-ID	4	Priority	High
Actor	User (Bioinformatician or Researcher in the medical field)				
Goal	To exit from the upload/history page				
Pre-condition	Logged in upload/history page				
Normal course	1. already Logged in upload/history page 2. click on the personal profile icon 3. choose to log out from the list 4. exit has done and now shows the home page				
Post-condition	Exit from upload or history page done Now you are on the home page				

Use case name	About	UC-ID	5	Priority	High
Actor	User (Bioinformatician or Researcher in the medical field)				
Goal	Description and some information about the project				
Pre-condition	Connect with the internet and Open Recona site				
Normal course	1. Open Recona site 2. click on the About bar 3. show a description of the project and brief information about the project, such as its objective, reference, Project definition, and the features it provides. It can be considered an abstract				
Post-condition	show a description of the project				

Use case name	Researches	UC-ID	6	Priority	High
Actor	User (Bioinformatician or Researcher in the medical field)				
Goal	Reference about lynch syndrome and database for testing Recona site				
Pre-condition	Connect with the internet and Open Recona site				
Normal course	1. Open Recona site 2. click on the Researches bar 3. show Reference about lynch syndrome (as links) to see it if you want and databases available to download test files for academic or research purposes and upload them on the recona site for analysis				
Post-condition	Show links that include information about lynch syndrome and enable the use of databases with test files				

Use case name	History	UC-ID	7	Priority	High
Actor	User (Bioinformatician or Researcher in the medical field)				
Goal	For saving any transactions on the recona site				
Pre-condition	Register on the recona site and do transactions (upload file on recona file for analysis)				
Normal course	1. Open Recona site 2. show the home page 3. click on the login bar 4. show the login page 5. enter your data like username and password 6. click on the login button, now log in successfully 7. show the upload page 8. click on the personal profile icon 9. choose a profile from the list 10. now show your profile history				
Post-condition	Show all transactions on the recona site				

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Performance requirements define acceptable response times for system functionality. Although the system is developed suited for the least system performance, the performance of the system will highly depend on the performance of the hardware and software components of the installing computer. When considering the timing relationships of the system the load time for user interface screens shall take no longer than two seconds. It makes fast access to system functions the login information shall be verified within five seconds causes' efficiency of the system Returning query results within five seconds makes the search function more accurate

5.2 Safety Requirements

In this system, it is very important to protect customer data from loss. Therefore, we use some software to store a copy of the customer's data to send it to him when it is lost via Gmail, and this data is stored in the server

5.3 Security Requirements

This system is a safety critical system, so it must have high protection due to the importance of the private information it includes, so we need some things to protect it from hacking or malware and so on for such systems, such as:

1. Anti-virus and anti-malware protection. These programs help detect and prevent viruses and malicious software.
2. Firewalls. Firewalls screen data coming in and out of computer networks, blocking unauthorized access and stopping traffic from unsafe internet sources.
3. multi-factor authentication measures. Multi-factor authentication can take many forms and requires the use of two or three different authentication factors. For example, you likely enter a password or PIN when you log in to your website. If the site needs additional verification from you, it may prompt you to answer a question that only you know the answer to or send a security code to a device that you've registered. This is also known as 2-factor or multi-step authentication. automatically log you out of your secure session after a period of inactivity to help prevent others from seeing or using your online accounts.

5.4 Software Quality Attributes

Availability: The system shall be available at any time.

Efficiency: Reducing the resources and time used in the system.

Flexibility: Ability to add new features to the system and handle them conveniently.

maintainability: how easy is to keep it as it is and correct defects by making changes.

Reliability: Specify the factors required to establish the required reliability of the software.