HOSPITAL MANAGEMENT SYSTEM

SE-216 SOFTWARE PROJECT MANAGEMENT

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Problem Definition

Within the light of advances in technology, health-care has evolved and nowadays software also takes place in the process. For example, due to including software to the process, doctors no longer have to track their patients individually or personally. Instead, with the help of a set of softwares they can manage their patients with ease. Thus, hospitals and health care centers nowadays must keep a record for each data related to every patient, doctor and nurse. Therefore, storing and managing the data, in todays hospitals, is playing a crucial role in health care process. Thus, hospitals and health care centers nowadays must keep a record for each data related to every patient, doctor and nurse. Therefore, storing and managing the data, in todays hospitals, is playing a crucial role in health care process

Background Information

The aim of the program is to create an easy, user-friendly, cost-effective and fast hospital management system. The program deals with subjects such as patient information, doctor information, treatment processes, drugs and hospital expenses. Traditionally, these processes were done manually in hospitals. In existing systems, data is stored manually, which requires a large number of paper documents. The risks of this method include lost papers, inconsistencies due to too many copies, and incomplete information

Objectives

- Reliability: The program has a high level of consistency and reliability. Data is stored without errors.
- Efficiency: The information in the program is error-free and is not repeated anywhere. This shows that the program and the data in the program are used efficiently.
- Fast access to data: The program provides easy and fast access to the data needed by the users.
- Ease of storing information: Problems in the process of storing information experienced in manual systems are not experienced in the program.
- User-Friendly: The system is user-friendly and simple, providing convenience for the user.

Scope

The intended project is to make a hospital management system. The system stores many data such as patient records, doctor records, drug information and treatment information for the operations to be performed. Unlike manual systems, it stores this information instantly and does not allow for the possibility of wasting time and errors. The program also provides a lot of convenience in editing and changing existing information.

FUNCTIONAL REQUIREMENTS

1- The Hospital Management System project should have a registration page including user name and password combination.
2- The Hospital Management System project, the doctor should be able to view all the patient's medical history, allergy details and current problems.
3- The Hospital Management System, disease predictions can be made according to the symptoms of the patients and necessary guidance can be provided.
4- The Hospital Management System, patients can make appointments by choosing the doctor they want on the day, date, city and hospital they want.
5- The Hospital Management System project should be able to process Doctor visits added to the total number of visits in order to ensure that the doctor can be paid according to the number of patients visited/serviced and the system may charge according to the service received by the patient.
6- The Hospital Management System can optionally give non-prescription medication advice to patients with mild health conditions such as colds and allergies.
7- The Hospital Management System can create and update the patient admission order according to the age of the patient, the pregnancy status of the pregnant women and the urgency of the problem.
8- The hospital management system allows the doctor to choose working hours, if the treatment hours selected by the patient do not comply with the doctor's schedule, the system gives a warning message.

NON-FUNCTIONAL REQUIREMENTS

1- The Hospital Management System must be working in latest operating system environments like windows 7, windows 8, windows 10 and windows 11.
2- The Hospital Management System must check each data before updating the main database, preventing any corrupt data to exist in the system.
3- The Hospital Management System should be able to store past appointments, health histories and personal information of patients, today and in the future. The Hospital Management System must be scaled up for increased volume demands for 24 hours.
4- The Hospital Management System must have proper data backup mechanism.
5- The Hospital Management System must be secured with proper user name and passwords.

STAKEHOLDERS

1- Development Team People: who are responsible of building the actual product and meeting the project goals.
2- Project Manager: Project managers are responsible for planning and overseeing projects to ensure they are completed in time and within budget.
3- Database Administrators: Ensure the security of the information in the project database.
4- Hospital Staff: Doctor, nurse assistant etc. working in the hospital.
5- Supplier: A supplier is a person or business that provides a product or service to project.
6- Government: Government is the institution that supports the project financially and authoritatively.
7- Hospital Clients: An individual who has been officially accepted to the hospital who receives health services.
8- Project Testers: A tester is an individual that tests software or similar projects for defects or any problem that the end-user may come across.

9- Hospital Manager: Hospital managers are the overseers of the general administration of hospitals and other provider facilities.
10- Sponsor: Provides the necessary resource support for the project.

PROJECT STAFFING

Project Manager: Project managers are responsible for planning and overseeing projects to ensure they are completed in time and within budget.

Java Developer: People who are responsible of building the actual product and meeting the project goals.

Database Administrators: Ensure the security of the information in the project database.

Software Design Architecht: A software architect makes high-level design choices and frames technical standards.

Tester: A tester is an individual that tests software or similar projects for defects or any problem that the end-user may come across.

NECESSARY NEEDS FROM THE ORGANIZATIONAL PROCESS

1- The system needs requirements analysis for further stages.
2- The system needs a database system to store clients data.
3- The system needs a website with separate interfaces for users and admins, accordingly.
4- Already existing client data must be transferred into the systems database.
5- The development cycle must be documented step by step.
6- The system needs testing of design and implementation.
7- The system should be maintained at regular intervals and the data of the system should be updated.
8- Already existing client data must be transferred into the systems database.

UNNECESSARY NEEDS FROM THE ORGANIZATIONAL PROCESS

1- Development process does not require a large budget.

2- In the waterfall model, the stages are planned in advance, so daily meetings are not needed in the project.

3- In the waterfall model, there is no need for pair work as the task is distributed among the team members.

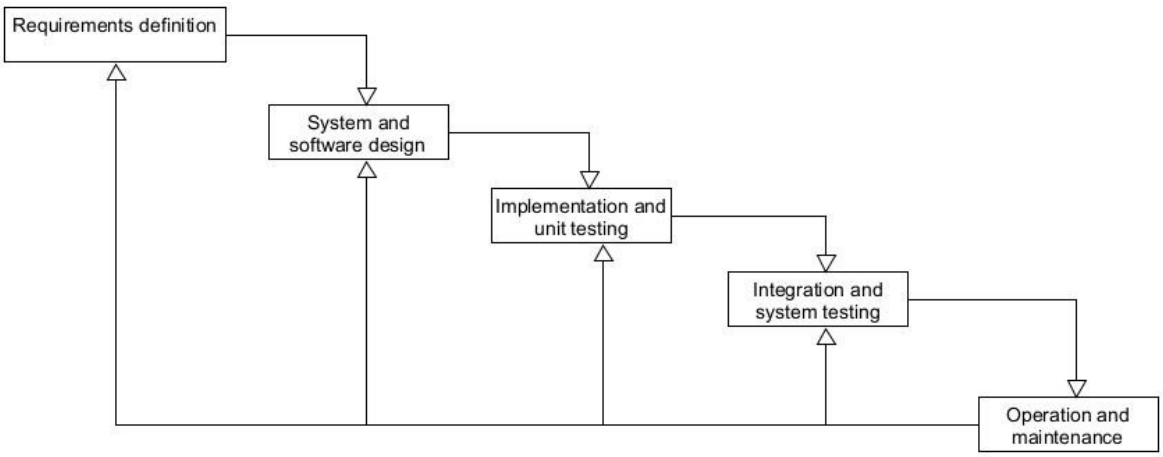
4- Since the system is largely consists of data transfers, coding process does not need a long time.

SOFTWARE PROCESS NAME: Waterfall Model

SOFTWARE PROCESS DESCRIPTION

The waterfall model is a plan-driven model. Documentation is frequently used. Progress in the project is usually measured by the completion rate of the documentation. The stages and requirements are clearly defined in advance. Therefore, it is not a model that is open to much change. Very little changes are made. Because the waterfall model is a phased model and since the testing part is one of the final stages, major errors in the project are usually noticed late. Although, it is easier to fix those errors, since everything is already documented.

SOFTWARE PROCESS MODEL



REASONS TO CHOOSE THIS MODEL

1- The waterfall SDLC model is suitable for our team and their skills, since our software development team does not consist of large number of people and we have the necessary coding experience and knowledge for the task.

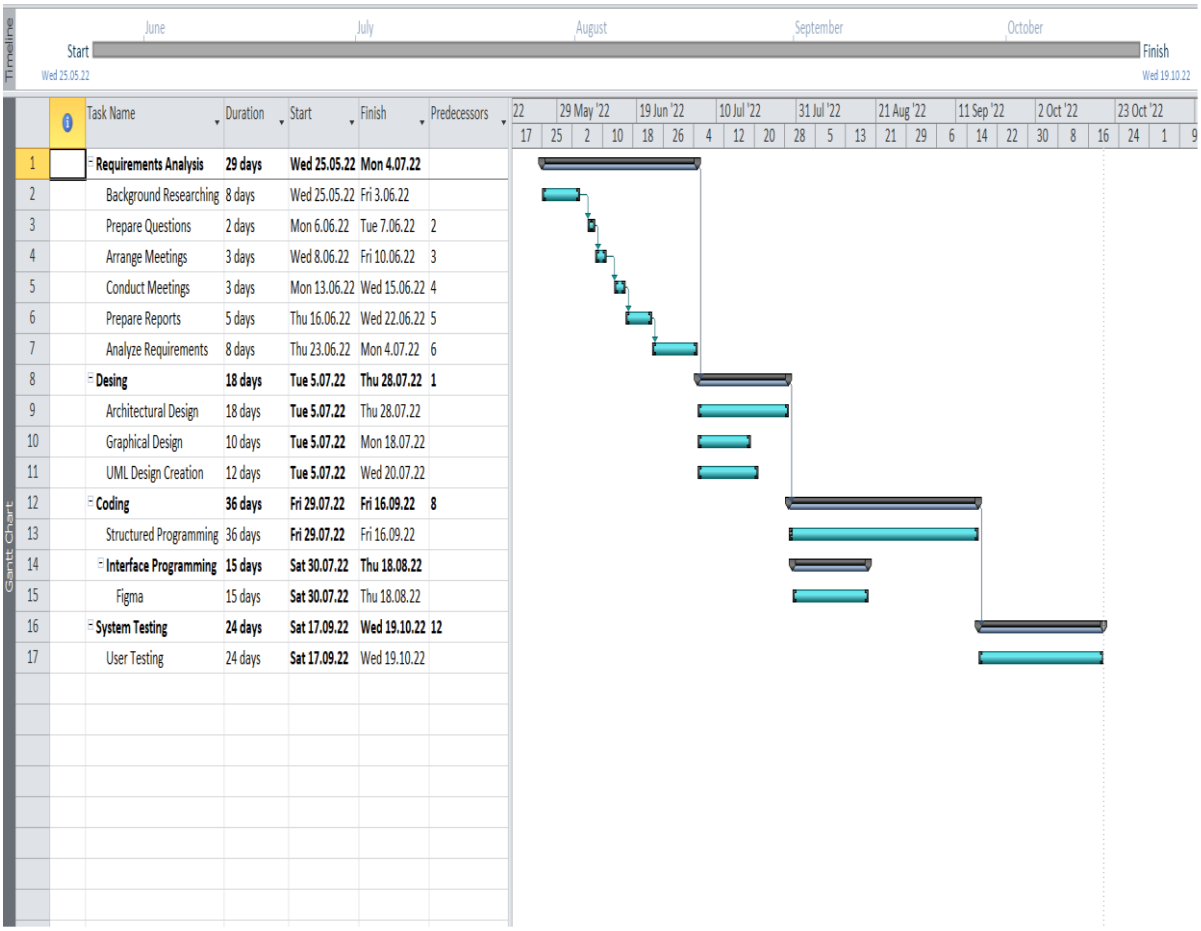
2- Since we do not depend on our stakeholders when it comes to software development, the waterfall SDLC model is easier to maintain and suitable both for us developers and our stakeholders. - Developing the system step by step from the requirements engineering to software maintanence, and being able to trace our steps back and changing or fixing the past development steps is suitable for the development process.

3- Our project, hospital maintanence system, is going to be designed and developed for a limited area, a hospital in this case. Therefore, the size and complexity of our software is not necesssarily going to be larger compared to other healt-care maintanence systems, meaning a SDLC like waterfall model would be sufficient and convenient.

4- The project is fundamentally a hospital maintanence system, not a health-care system. Sizewise its smaller. Hence, more complex the software development cycle gets harder for our development team to keep up with the process. Thus, waterfall SDLC mdoel is relatively more comfortable for our project teams needs.

5- A hospital management system is vital when it comes to clients and doctors, meaning it must work smoothly without errors. The risk of receiving inaccurate results is not accaptable for th hospital. Waterfall SDLC model covers the entire development process step by step, meaning it is harder to miss an error in the development process. Also, it is easier to make changes in waterfall model and redesign it for our development teams needs.

SCHEDULE AND EFFORT



	Task Name	Duration	Start	Finish	Predecessors
1	**Requirements Analysis**	**29 days**	**Wed 25.05.22**	**Mon 4.07.22**	
2	Background Researching	8 days	Wed 25.05.22	Fri 3.06.22	
3	Prepare Questions	2 days	Mon 6.06.22	Tue 7.06.22	2
4	Arrange Meetings	3 days	Wed 8.06.22	Fri 10.06.22	3
5	Conduct Meetings	3 days	Mon 13.06.22	Wed 15.06.22	4
6	Prepare Reports	5 days	Thu 16.06.22	Wed 22.06.22	5
7	Analyze Requirements	8 days	Thu 23.06.22	Mon 4.07.22	6
8	**Desing**	**18 days**	**Tue 5.07.22**	**Thu 28.07.22**	1
9	Architectural Design	18 days	**Tue 5.07.22**	Thu 28.07.22	
10	Graphical Design	10 days	**Tue 5.07.22**	Mon 18.07.22	
11	UML Design Creation	12 days	**Tue 5.07.22**	Wed 20.07.22	
12	**Coding**	**36 days**	**Fri 29.07.22**	**Fri 16.09.22**	8
13	Structured Programming	36 days	**Fri 29.07.22**	Fri 16.09.22	
14	**Interface Programming**	**15 days**	**Sat 30.07.22**	**Thu 18.08.22**	
15	Figma	15 days	**Sat 30.07.22**	Thu 18.08.22	
16	**System Testing**	**24 days**	**Sat 17.09.22**	**Wed 19.10.22**	12
17	User Testing	24 days	**Sat 17.09.22**	Wed 19.10.22	

MEASUREMENTS

Questions to identify measurements

How many changes have been made to the project?

Identified measurements

Number of changes of requirements in the project and formation of new requirements.

The amount of growth of the product in the project over time.

Number of changes made in order to correct the errors found in each reviewed product during and after the review.

Measurement storage and collection

WHAT – Fixed problems

FORMAT – Real number data

HOW - Entered into prespecified project spreadsheet by review leader

Measurement Type	**Description**	**Example Measurements**
COST	The money spend on project.	Total expenses
CHANGE	Number of change during and after the development	Defects, moduls changes
EFFORT DISTRUBITION	Number of hours of each process.	Hours spent on major activities

MANAGEMENT DATA	Data of project management.	Project length, cost, staffing levels
PRODUCT SIZE	The size of the programs used in the project.	Number of components
DOCUMENTATION	Written documentation.	Number of total page of documentation
TEAM PRODUCTION	Work done by team.	Total completed tasks

RISKS

LIKELIHOOD RANK	RISK DESCRIPTION
1	Testing-Testing the product will be difficult as the distribution platform cannot be purchased or installed at this time.
2	Debugging- Effective debugging will be difficult because not many changes are made to the waterfall model and the defect may not be found immediately.
3	Design Complexity-Team has little experience in communication protocol and system design.
4	Database Security- In case of a problem in the hospital database, the information of the users may be disclosed or a malfunction in the system may occur.
5	System vulnerability- An overlooked flaw during the development phase of the project may result in existance of vulnerabilities and system downtime may occuur.
6	Requirements Volatility-Requirements may vary/change during the development phase of the project and in Waterfall Model a change request should be submitted and agreed upon by the PM/Stakeholder
7	Training-The team need to come up to speed very quickly with the development and deployment platforms.
8	Tools-Team must learn new design management tools to improve the project.

IMPACT RANK	RISK DESCRIPTION
1	System vulnerability- An overlooked flaw during the development phase of the project may result in existance of vulnerabilities and system downtime may occuur
2	Database Security- In case of a problem in the hospital database, the information of the users may be disclosed or a malfunction in the system may occur.
3	Debugging- Effective debugging will be difficult because not many changes are made to the waterfall model and the defect may not be found immediately.
4	Testing-Testing the product will be difficult as the distribution platform cannot be purchased or installed at this time.
5	Requirements Volatility-Requirements may vary/change during the development phase of the project and in Waterfall Model a change request should be submitted and agreed upon by the PM/Stakeholder.
6	Design Complexity-Team has little experience in communication protocol and system design.
7	Training-The team need to come up to speed very quickly with the development and deployment platforms.
8	Tools-Team must learn new design management tools to improve the project.

LIKELIHOOD RANK	IMPACT RANK	COMBINED RANK	RISK DESCRIPTION
1	4	5	Testing-Testing the product will be difficult as the distribution platform cannot be purchased or installed at this time.
2	3	5	Debugging- Effective debugging will be difficult because not many changes are made to the waterfall model and the defect may not be found immediately

5	1	6	System vulnerability- An overlooked flaw during the development phase of the project may result in existance of vulnerabilities and system downtime may occuur
4	2	6	Database Security- In case of a problem in the hospital database, the information of the users may be disclosed or a malfunction in the system may occur.
3	6	9	Design Complexity-Team has little experience in communication protocol and system design.
6	5	11	Requirements Volatility-Requirements may vary/change during the development phase of the project and in Waterfall Model a change request should be submitted and agreed upon by the PM/Stakeholder
7	7	14	Training-The team need to come up to speed very quickly with the development and deployment platforms.
8	8	16	Tools-Team must learn new design management tools to improve the project.

Software Tools

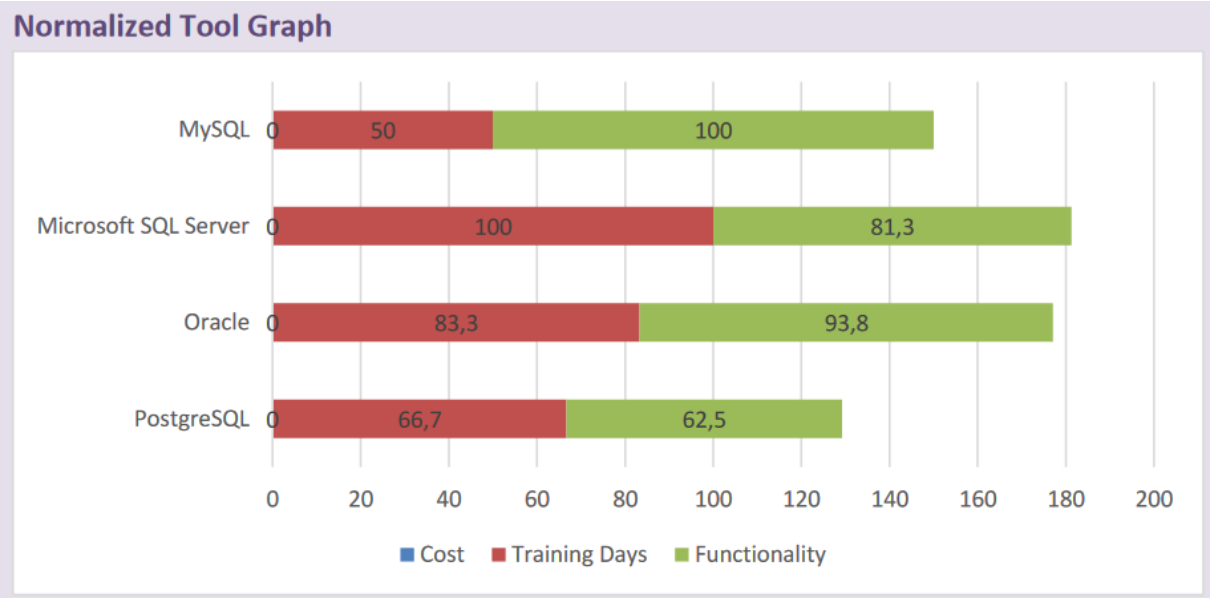
Software Development Environment

Tool	Intellij Idea	Eclipse	Apache NetBeans	Visual Studio Code
Cost	$499	Free	Free	Free
Training Days	1 days	3 days	4 days	2 days
Functionality	80	70	50	60

Intellij IDEA is by far the best choice since it is well optimized, open source, has an useful interface and the developer team is more experienced in Intellij IDEA. Therefore, team members can handle their work much more comfortably compared to other IDEs.

Database Management System

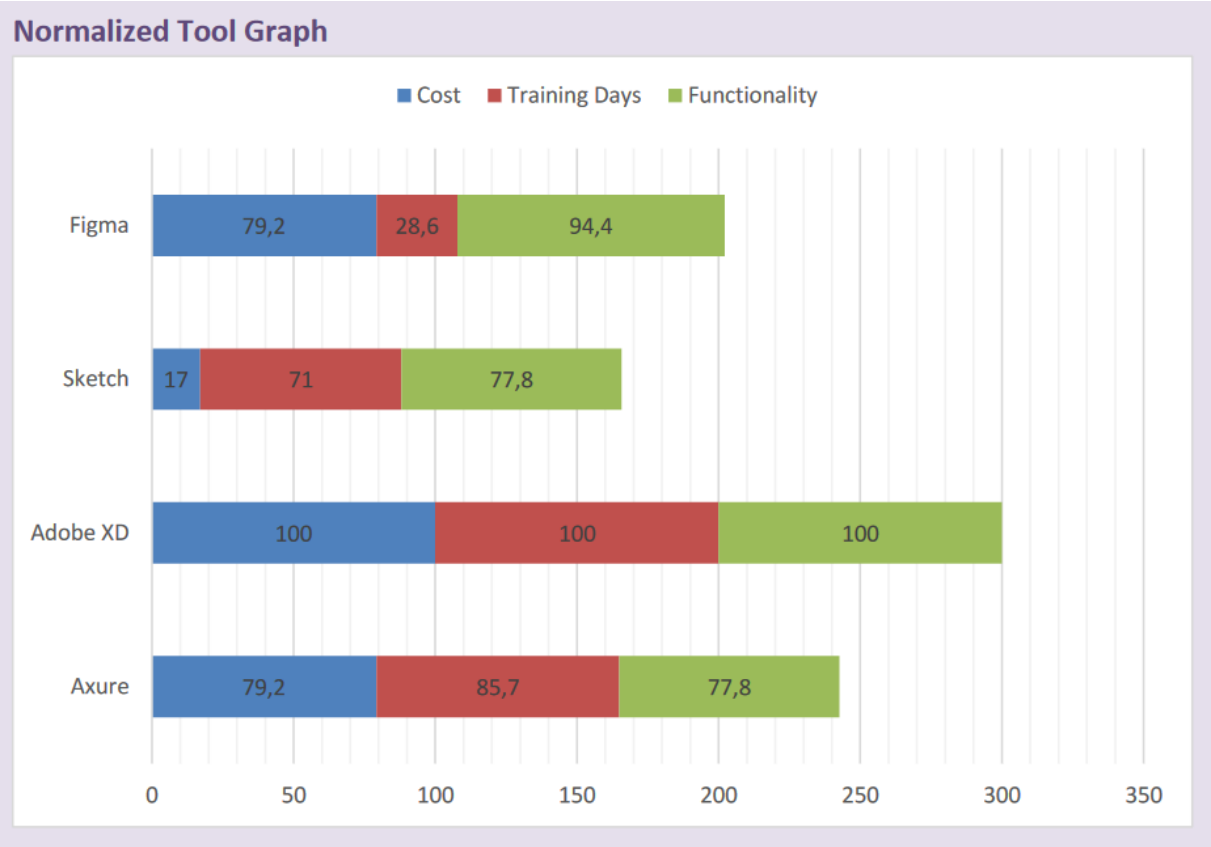
Tool	mySQL	Microsoft SQL Server	Oracle	PostgreSQL
Cost	Free	Free	Free	Free
Training Days	3 days	6 days	5 days	4 days
Functionality	80	65	75	50



MySQL is the best choice for the system. MySQL has high performance and usability. The most important features that make MySQL stand out are its strong transaction support and strong data protection.

Graphical User Interface Tool

Tool	Figma	Sketch	Adobe XD	Axure
Cost	$42 /month	$9/month	$53/month	$42/month
Training Days	4 days	10 days	14 days	12 days
Functionality	85	80	90	70



Figma would be the wisest choice among other GUIs. The most important advantage of Figma over other programs is that it can run in the browser. Furthermore, Figma lets you share design files and collaborate in real-time, more suitable for teamwork.

PROJECT NEEDS

Software Needs

1 - Integrated Development Environment: The development team needs an IDE for the coding process. Intellij is recommended.

2 - Software Project Management Tools: Software Project Management Tool fulfills the team management needs, such as forming a work plan or following the progress of the members. ClickUp is recommended.

3 - Operating System: An operating system is needed for hardware and software resources (processor, memory etc.). Windows 10 is
recommended.

4 - Database Tools: Database administrators should securely protect and store data in the project. MySQL is recommended.

5 - Source Control Tools: Developer Team will utilize GitHub to manage easily with source code.

6 - Interface Tool: A tool is required to create the necessary interface for customer use. Development team will work on Figma for application's user interface.

Hardware Needs

1 - Ram: RAM provides storage space for program codes and data in the project. In addition, high RAM enables the team to work faster
and more effectively. 64GB of RAM is recommended.

2 - Processor/CPU: The processor is the device that provides the data flow. The advanced processor enables the developers to work faster and more efficiently. It also enables more than one program to work at the same time. Intel i7 or Ryzen 7 is recommended.

3 - Hard Drive/SSD: A powerful SSD speeds up the computer's processing process. SSD is much more useful in terms of speed than HDD. M.2 NVMe SSD 1TB is recommended.

4 - Desktop PC: A computer is needed to provide effectiveness for the project development team to work for hours and days.

5 - Monitor: Coding with 2 screens is necessary for effective and efficient work.

6 - Mobile phones for testing (Android and Iphone - Optional): A phone is required to test the product before it is delivered to the customer.

Support Needs

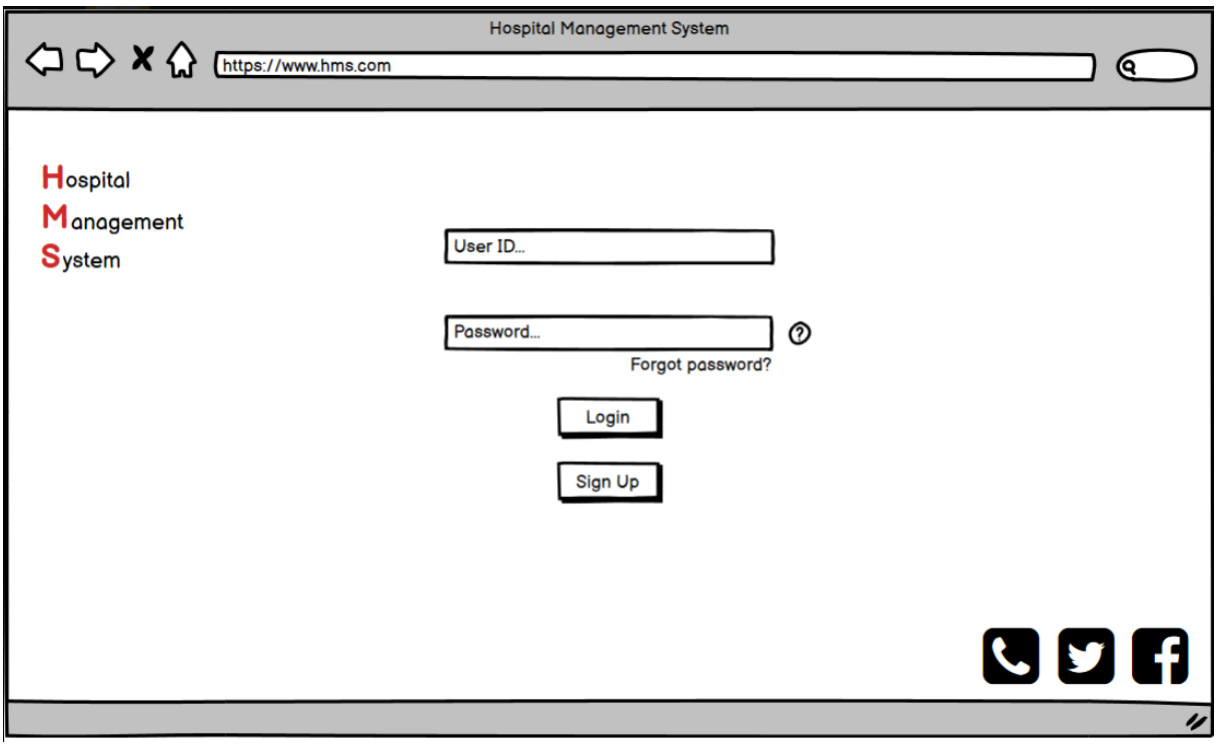
1 - Git: Git helps the developer team to see and follow each others progress in project and work as a group.

2 - Stackoverflow: Stackoverflow is a platform that allows developers in the field of software to help each other and share source code.

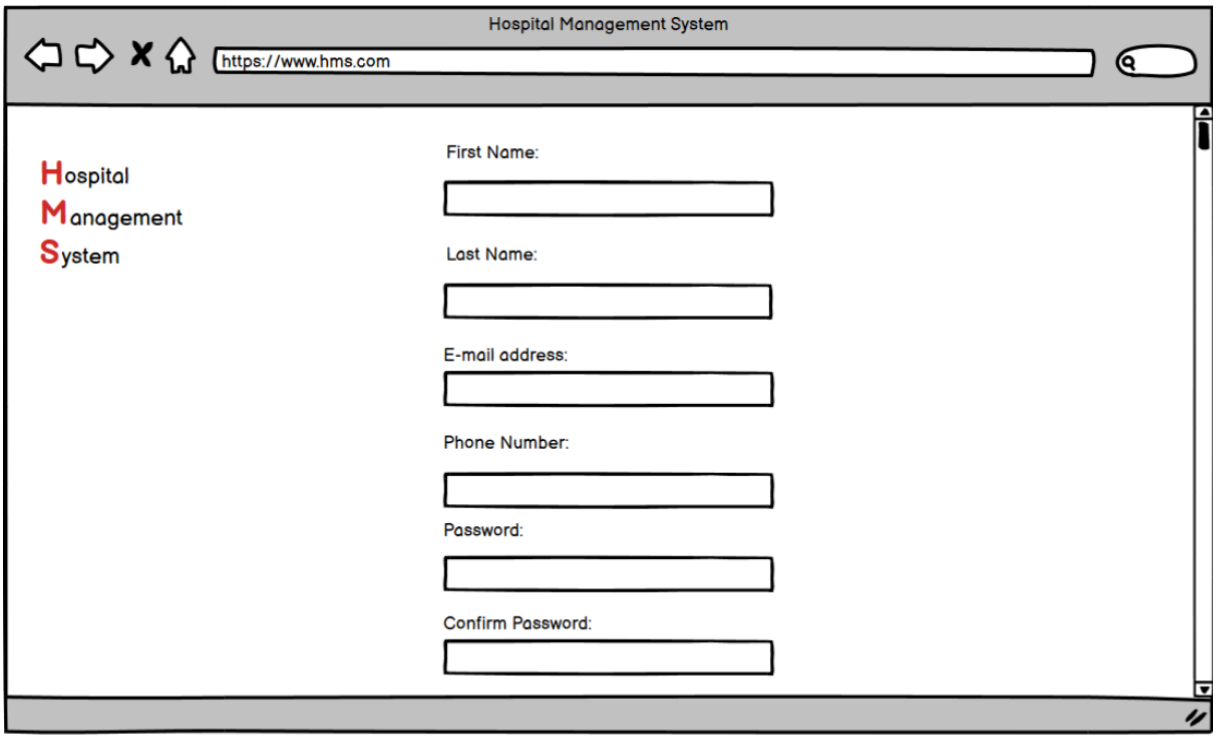
3 - Zoom: Recommended for meetings with stakeholders to be uninterrupted and efficient.

4 - Discord: Recommended because it's fast and efficient for development team meetings and resource sharing.

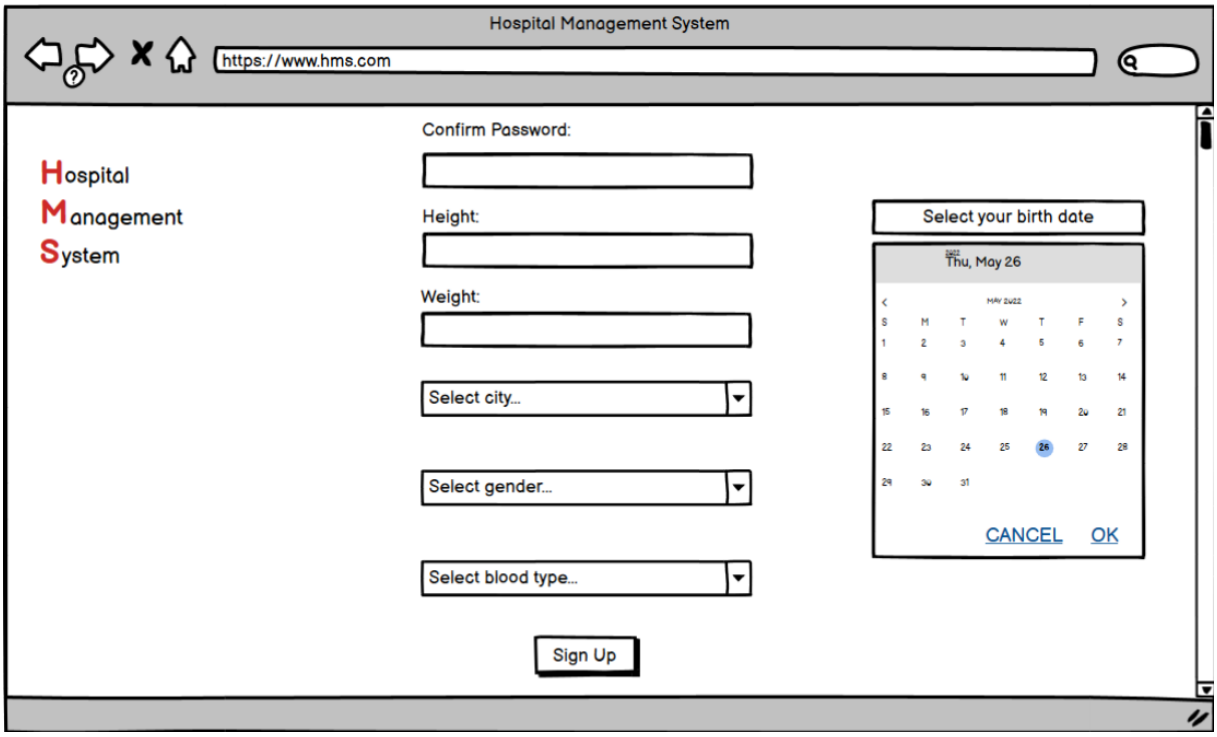
Graphical User Interface – Login Page:



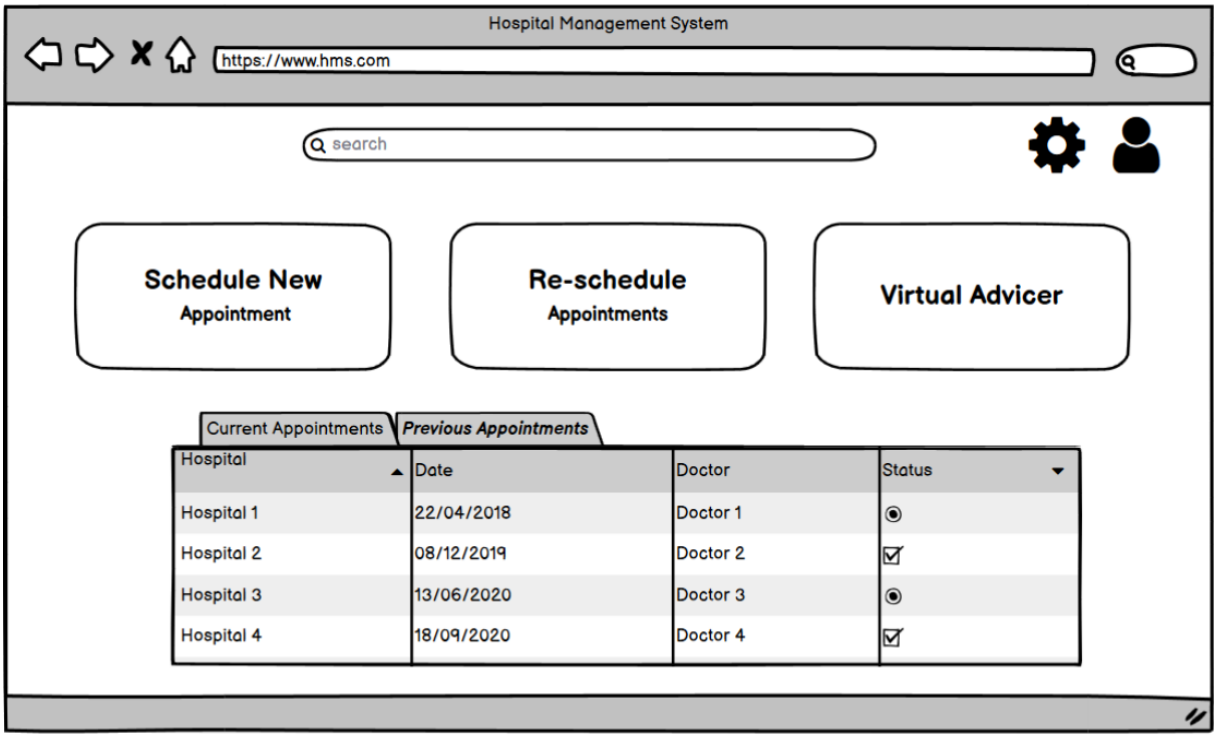
Sign Up Page-1:



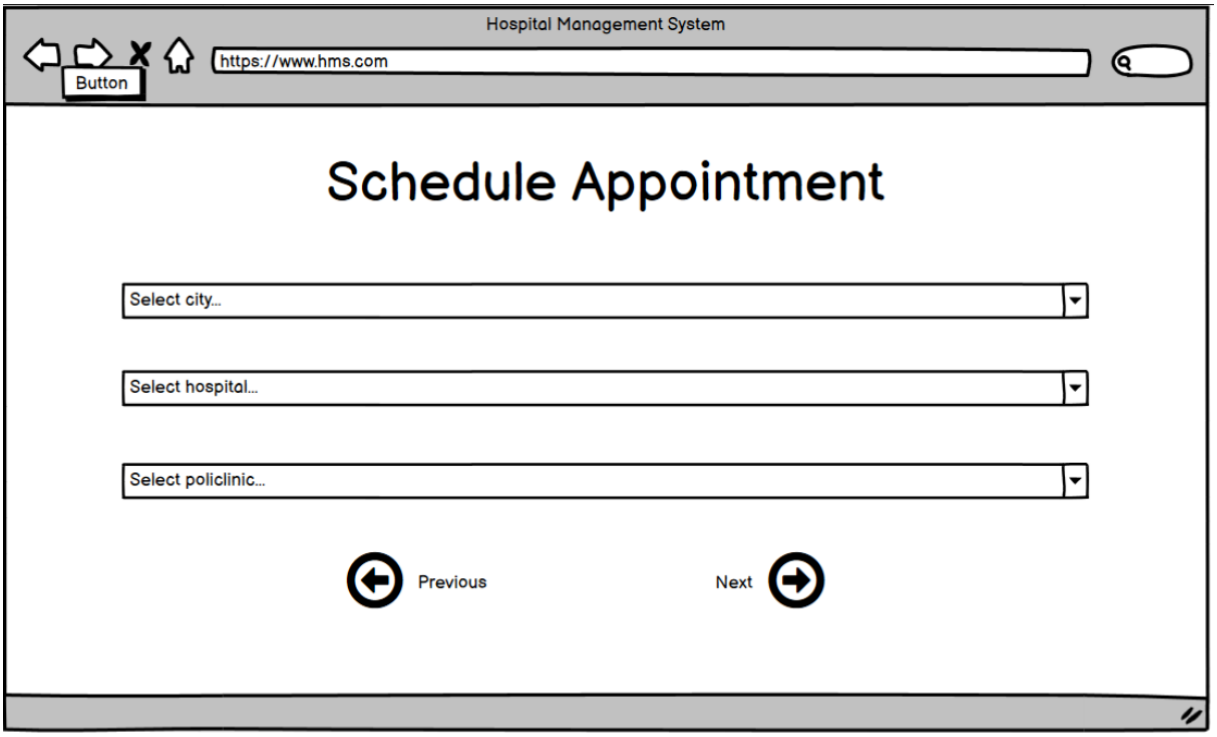
Sign Up Page-2:



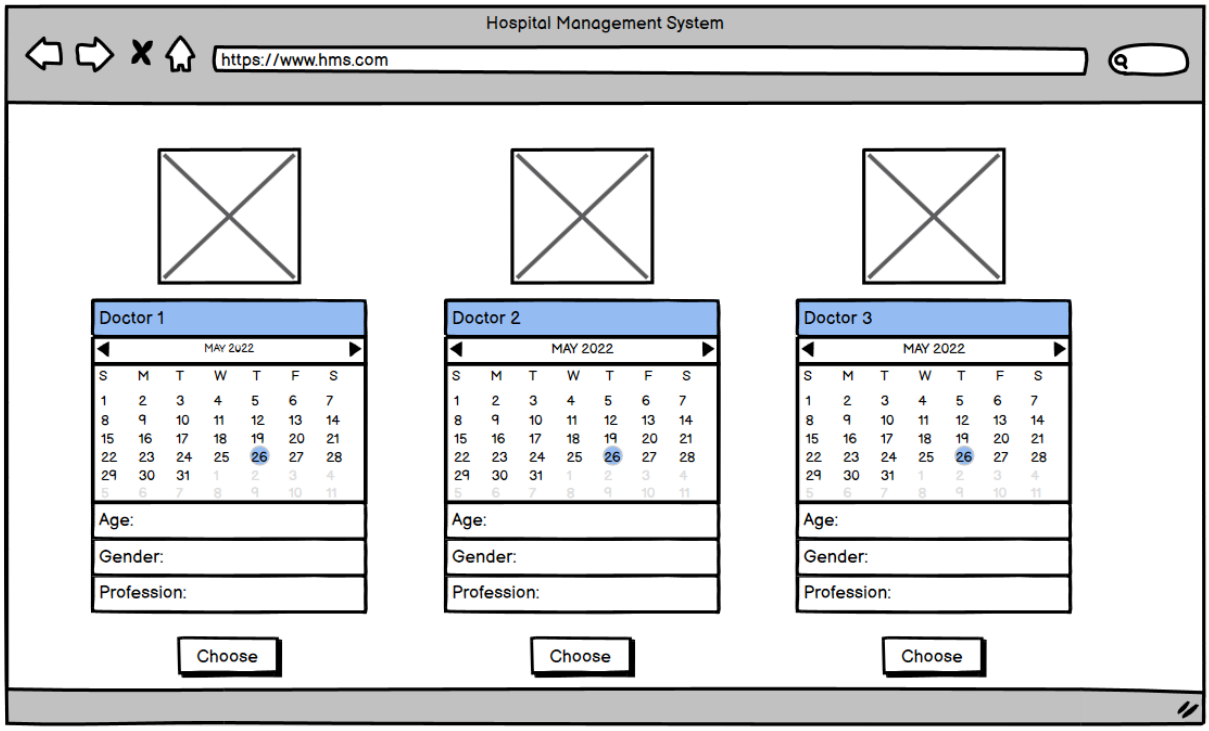
Main Page:



Schedule Appointment page:



Choosing Doctor Page:



CONCLUSION

The purpose of this project was to create a hospital management system using the latest developments in software. During our researches we realized that many of the existing hospital management systems are running on old systems and made by using relatively former software. The most important aspect of this project at this point is to bring a fresh approach to management systems by utilizing the latest possible software resources and creating a better, faster and more managable hospital management system in the process.

In addition, the system also includes several extra features such as helping patients with minor cases, giving advices depending on the medical history of the patient and having useful info about drugs and medicines. As for the the program itself, it fulfills the fundamental system requirements such as booking appointments, choosing medical staff etc.

We believe that, considering the entire development plan, the project is a succesful investment for private hospitals and medical facilities. In summary, it offers easier management and faster data processing possibilities.