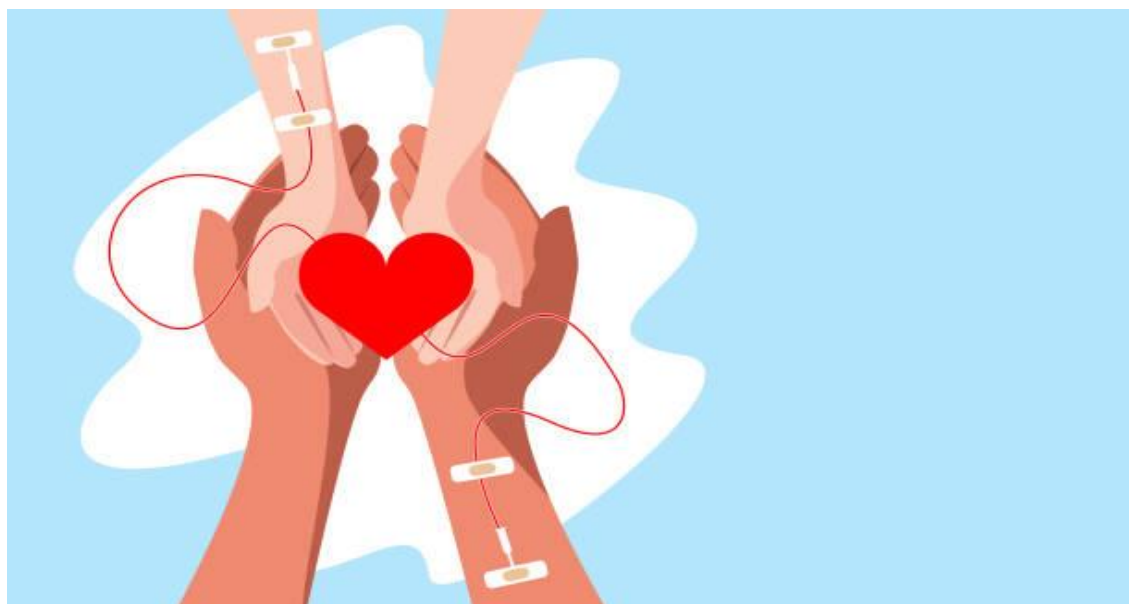


Final Report

Blood Donation Website



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Abstract:

Blood banks currently face a significant support issue. Even though it is an essential part of the health care system that is needed on a daily basis but to this day it does not have any online presence in Egypt. The website aims to ease the process of donation & requesting blood for the public and to build a strong network between the blood banks, hospitals, and the people of Egypt.

To achieve this goal, a website was made. The purpose is to help potential donors register easily and see if they're eligible for donation, and if so, to find the nearest blood donation center. Requests are also provided for those in an emergency who need blood bags of a certain type.

As a result, it is expected to have an increase in the number of donors and easier blood donating experience for the public, as well as a better support system for those in need of those donations.

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Introduction:

Every year patients of various diseases need blood. Among them, some need a regular transfusion of blood. Hence, safe blood save life but unsafe one takes life. Ensuring regular flow of safe blood is a great challenge for the community in developing countries. Various public and private organizations are working for this purpose. Although the number of blood donor is increasing, there is still a huge gap in demand and supply of blood.

Every year a number of people die due to lack of safe blood. Patients suffering from various kinds of diseases and accidents need blood. Especially the patients of thalassemia, sickle cell disease and cancer need regular blood transfusion. There is a time laps within which collected or stored bloods need to be used. Otherwise, collected or stored blood can't be used. In this case, it is necessary to have a regular flow of blood in blood banks or blood donating organizations to meet the regular demands. Besides, people need blood for pregnant mothers in case of delivery and for various surgical processes. Hence, blood is considered as the best gift given by a people to another. Safe blood gives life to people (WHO, 2018).

There are three major sources of blood -paid or professional donors, patients' relatives or replacement donors and volunteer donors. Youth is the main source of voluntary blood donation. To ensure the availability of safe blood for the patients, young can be encouraged.

1) Requirements and Analyzing:

The requirements engineering process

A) Feasibility study:

What if the system wasn't implemented? **Answer:** Lack of blood bags.

What are current process problems?

Answer: Difficulty of Donating & Requesting blood.

How will the proposed system help?

Answer: Simplifying Donating & Requesting blood

Provide blood in all centers and hospitals of Region

What facilities must be supported by the proposed system?

Answer: The Minister of Health / Egyptian Government / Egypt blood bank
/Hospitals

Feasibility Analysis examines key aspects of the proposed project and have three types as we see:

❖ **Organizational Feasibility** (If the system contributes to organisational objectives) : at this feasibility, we should provide sufficient support for the donors and requesters , look to the system and see if it'll must keep up with government's system , if it's being developed and implemented, try to reach the target of easy to maintain.

❖ **Technical Feasibility** (If the system can be engineered using current technology): at this feasibility, we should look at the accuracy of the system and try to reach the most accuracy that we can, we should also consider the most reliability and security.

❖ **Economic Feasibility** (If the system will provide business value): at this feasibility, we should answer the question of is the system economically feasible or not. In another word, we should consider the costs of hardware & software.

B)Requirements Elicitation (Discovery):

After having a discussion with product supervisor doctor of Regional blood bank in Alexandria , the system was understood.

Each donor should register with his national id using (E-Delphing) governmental registration system. The systems checks the last donation date of every regular donor , to see if the donor passed 3 months , so he is eligible to donate , if not , he is rejected. Before donation , donor should do a blood analysis to check his eligibility

To request blood , the hospital should send a permission (Ornek) include all the demanded information about patients.

In case of emergency , two scenarios could happen :

- One of the patient relation come to donate and the blood bag are given away.
- The system send a message for all regular donors to come and donate , if there are lack in blood bags.

Doctors are the administrator of the system , they review donor's response and blood analysis , check their eligibility (reject non-eligible ones) . Enter user info to the database , check the permission of any made blood requests.

C)Requirements specification:

There're two types of requirements:

- **Functional requirements:**

Usually expressed as set of functions or behaviors the system should be able to do.

- **Non-functional requirements (NFR):**

Referred to the set of constraints or qualities of the system. It is related to system performance, interfaces, designs and software quality attributes.

Requirements Description :-

Donors :

1.Donor should be able to sign up , log in.

1.2.Product Requirement (Security): Donors' Password shall be hashed.

2.Donor should be able to Donate

3.Donors are shown a map with the nearest blood donating center.

4.Upon donation, Donors are asked about the last time they donated.

4.1External Requirement (Safety): Donors shall not donate unless their last donation was 3 months ago

Requesters :

5.Hospital should able to sign in.

6.Hospitals should request certain blood donations from the blood bank.

6.1.External Requirement (Legislative): It's not applicable for the hospital to take the blood without permission.

7.Patient should Request blood without signing in.

8. Patient should request certain blood donations from the blood bank

8.1.External Requirement (Legislative): It's not applicable for the Patient to take the blood without permission.

System :

9. System should enable the administrator to create, delete, and update.

9.1.Product Requirement (Security): Access for donors and admins is limited to ensure security and privacy.

9.2.Product Requirement (Performance): System should be available for 24 hours a day and 7 days a week.

9.3.Product Requirement (Usability): System should have simple & user-friendly interfaces for everyone to understand the functionalities easily.

D)Requirements validation:

1) Validity: System will provide two main functions (Donation & Requestion) which User needs.

2) Consistency: System has not any requirements conflicts.

3)Completeness: System will provide all requirements in specification level.

4)Realism: System will be implemented with chosen technology and available budget.

2) Software Design:

1) Context design : Understanding the relationships between the software that is being designed and its external environment.

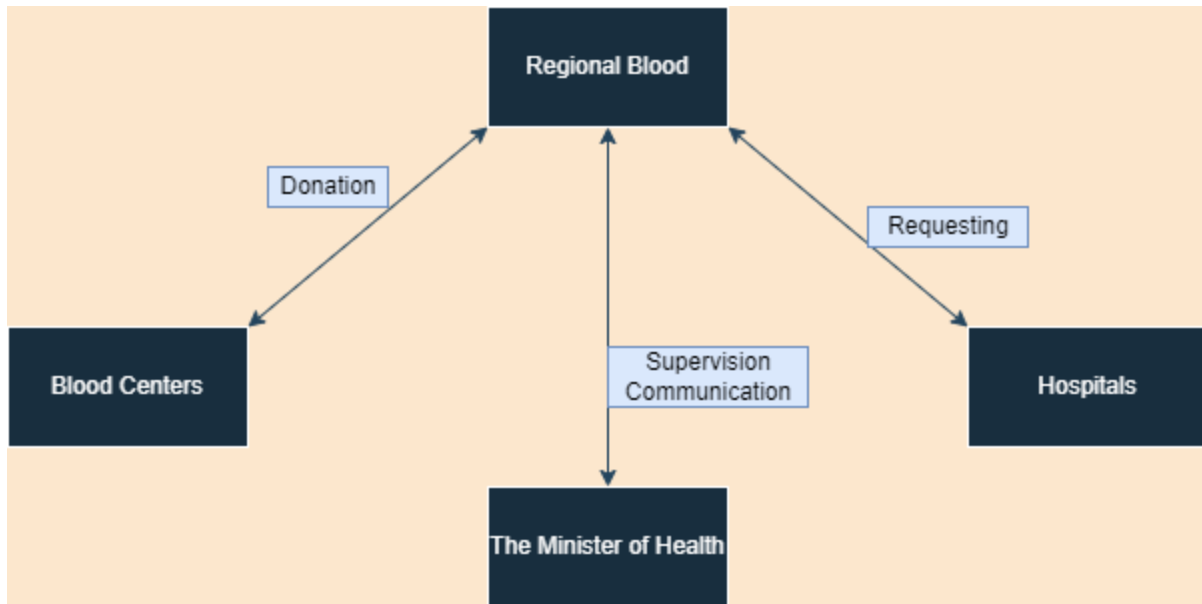


Figure 1:Context diagram

2)Architectural Design : identify the major components that make up the system and their interaction

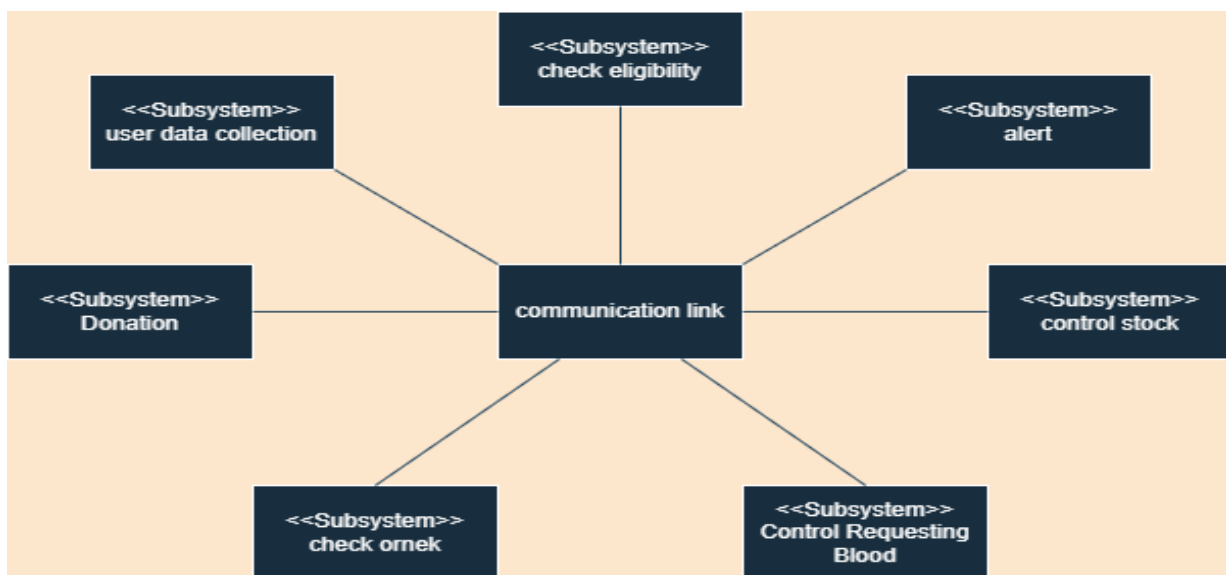


Figure 1:Architecture diagram

3)Behavioral Models :

Use-Case Diagram: it's a diagram used to describe the relationships among the functionalities and their internal/external users.



Figure 3 : Use Case Diagram

State Machine Diagram: it's a diagram used to the behavior of objects that act differently according to the state they are in at the moment.

Hospital :

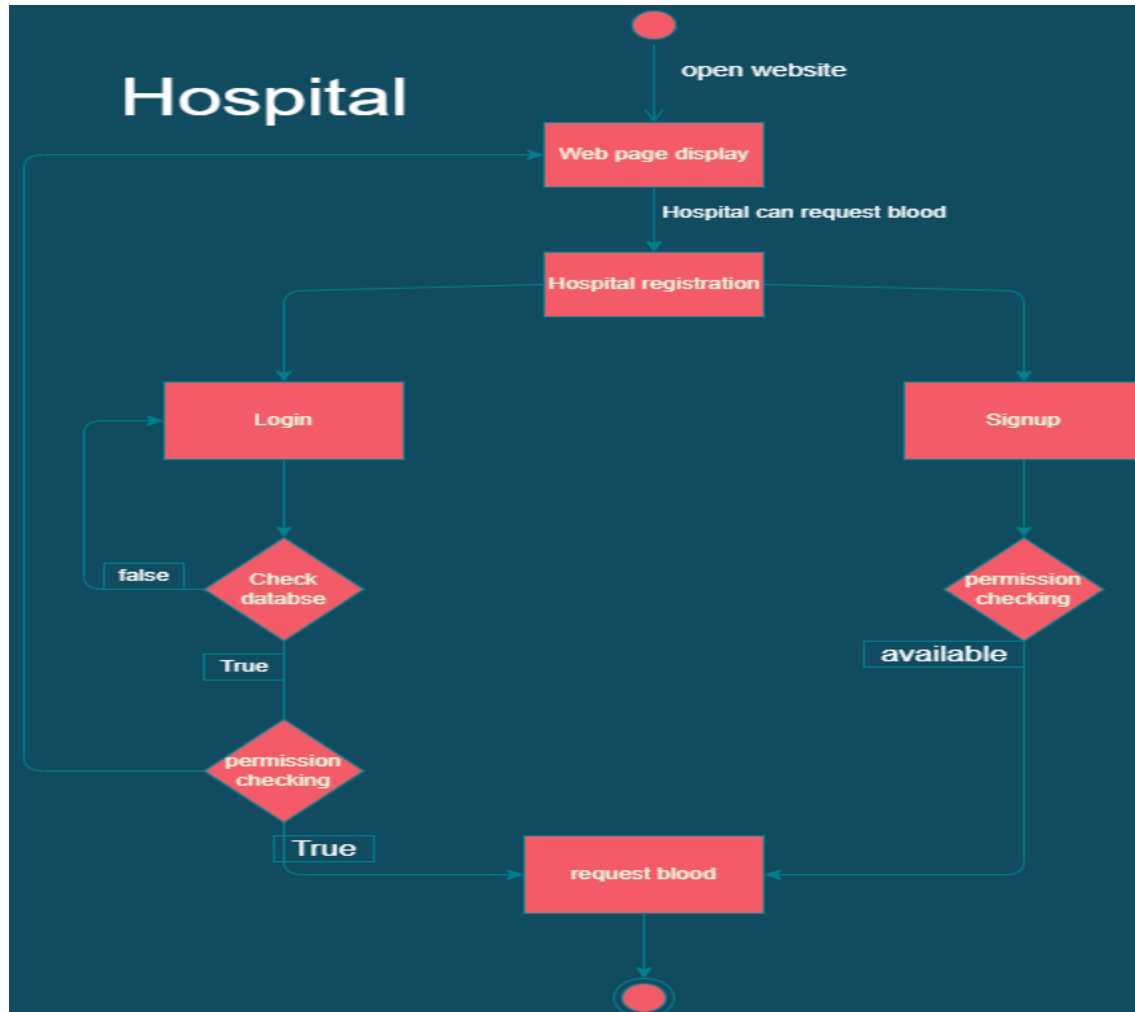


Figure 4:Hospital State Machine Diagram

Requester:

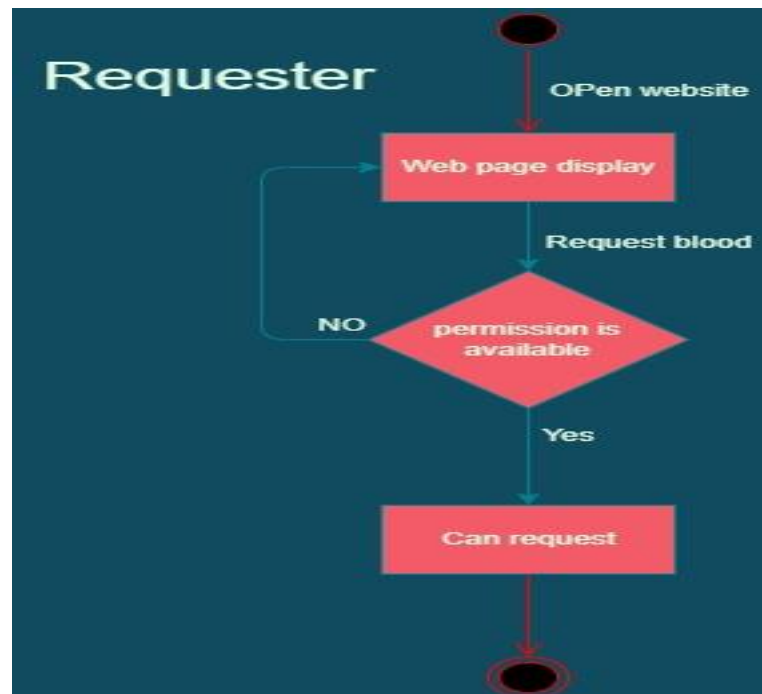


Figure 5 : Requester State Machine Diagram

Sequence Diagram: it's a diagram used to model the interactions between the actors and the objects within a system.

Donor:

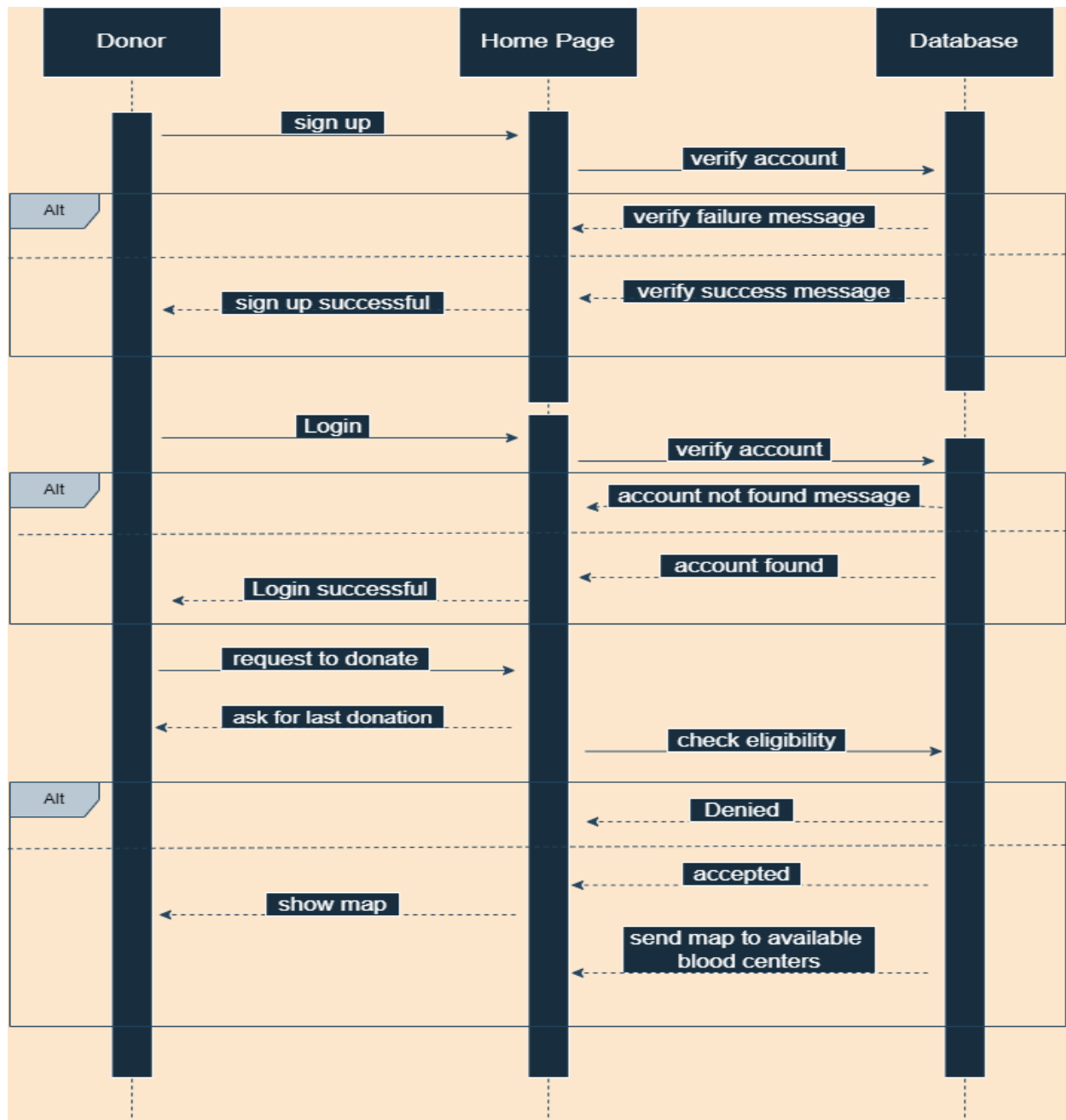


Figure 6: Donor Sequence Diagram

Admin:

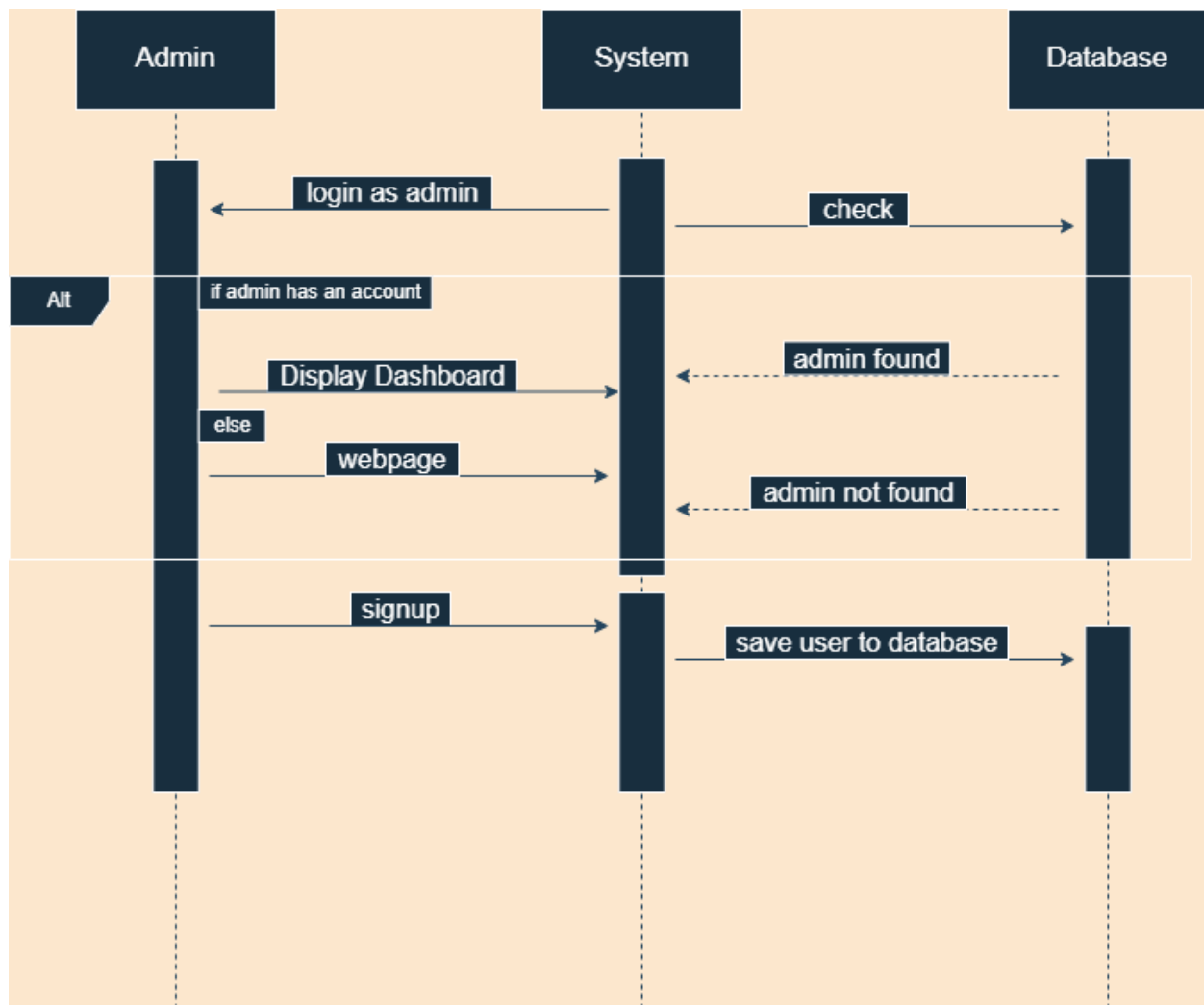


Figure 7: Admin Sequence Diagram

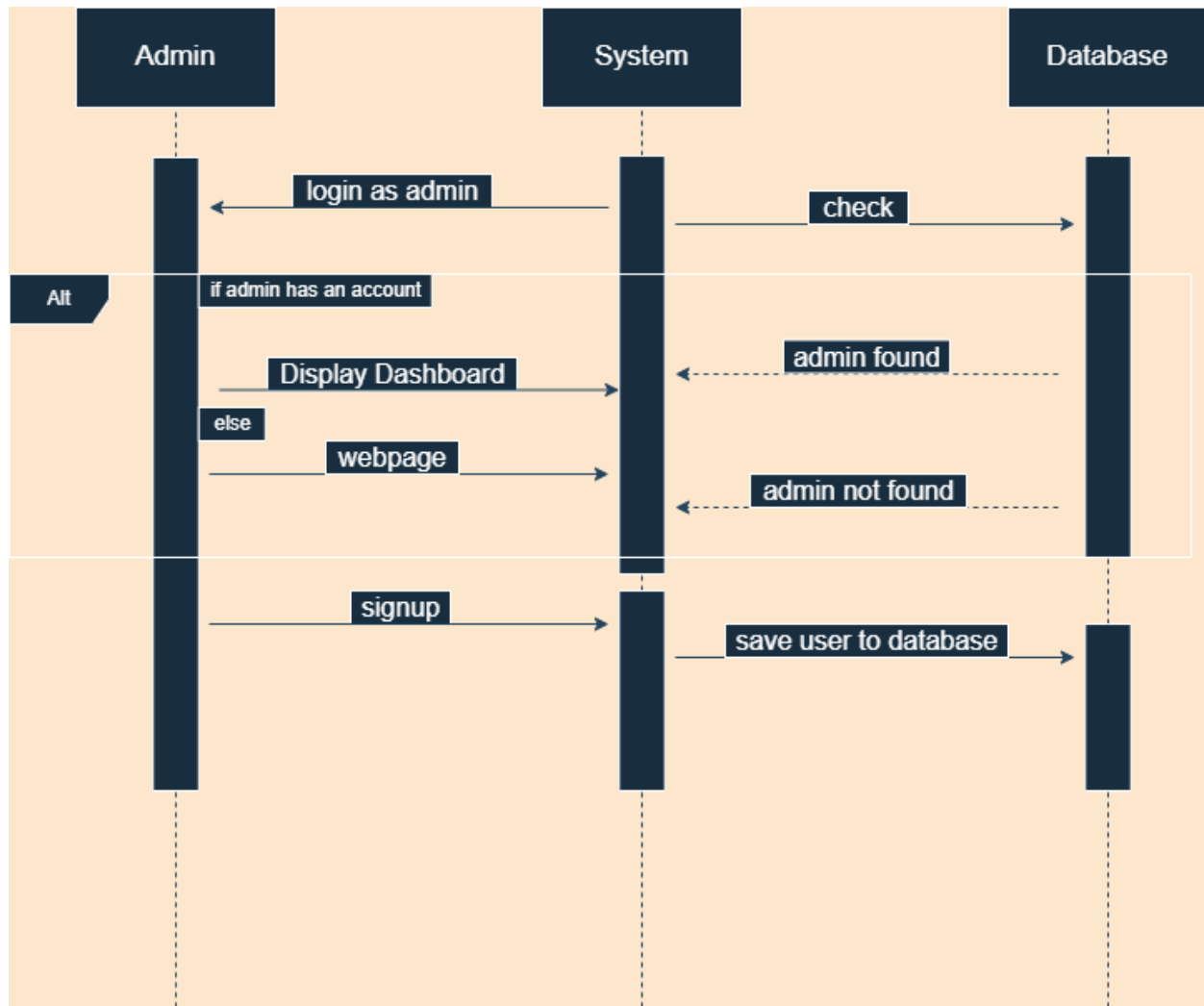


Figure7.1 : Admin Sequence Diagram

4)Structural Design:

Er Diagram: Entity-relationship diagrams (ERDs) are a logical representation of data that describes the relationships among entities and attribute.

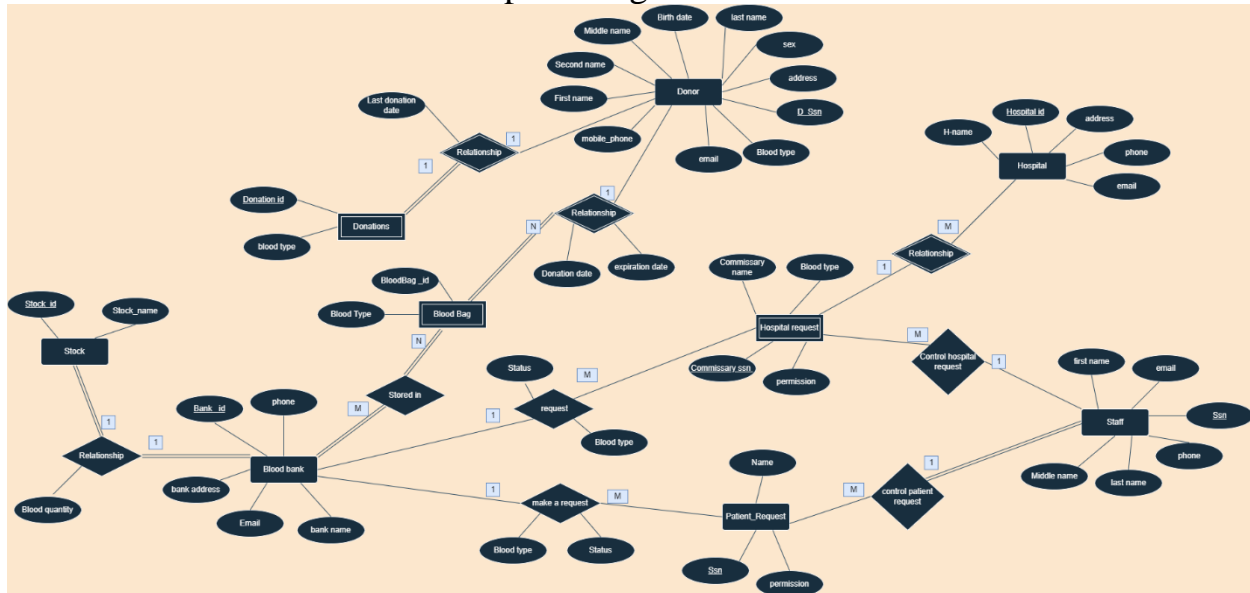


Figure 8: ER Diagram

Class Diagram: it's a diagram used to represent the object-oriented view of a system, which is static in nature.

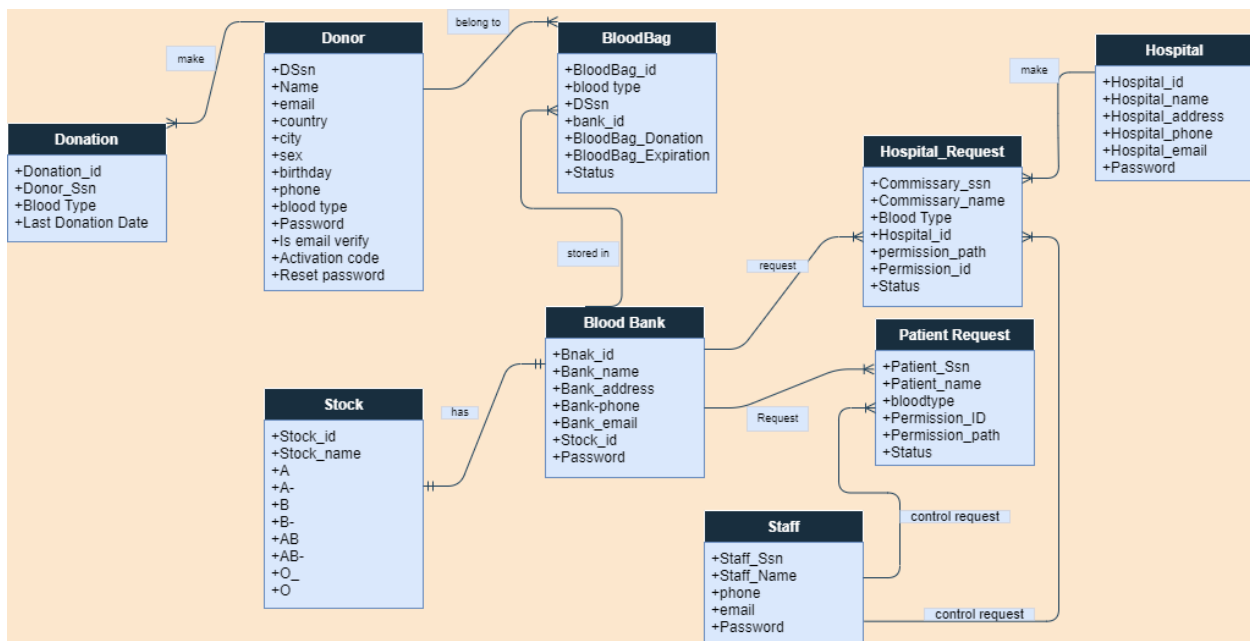


Figure 9: Class Diagram

3) Software Implementation:

A)Framework & Model:



Figure 10 : ASP .Net Framework

Asp.net is an open-source framework and cross-platform for developing modern web applications based on cloud architecture.

The .Net framework is easy to create useful web applications because :

- 1)**Better Productivity** : .NET framework has amazing class libraries, common APIs, and multi-language support that improves developer productivity.
- 2) **Language Support** : .NET supports over 60 programming languages to build software programs. Some of them are developed by Microsoft like Visual Basic, C#, C++, and more.
- 3) **Wide Community** : It has one of the largest and most active communities in the programming industry, Apart from that, there are a number of courses offered by Microsoft itself to help developers learn the web framework.

The System will be built by **Waterfall Model** because :

- 1) Blood Donation System is a Critical System that works with the government and The Ministry of Health.
- 2) Waterfall Model is used only when the requirements are very well known, clear, and fixed.
- 3) Blood Donation System's Requirements will not change radically.

B)Database:

There are too many reasons to use SQL Server with ASP.Net Framework :

1. SQL Server, Visual Studio, and the entire .NET ecosystem, are built to work together. While you can use MySQL with .NET, it doesn't integrate as nicely.
2. SQL Server has better replication support. If you ever need to scale your database beyond a single-server or simple master-slave configuration.
3. Faster Query Processing , Large amount of data is retrieved quickly and efficiently.
4. Standardized Language , Due to documentation and long establishment over years, it provides a uniform platform worldwide to all its user.

C)Microservices:

Blood Donation System can be done using Microservices, but:

1. **A simple application.** Small applications which do not demand much business logic, superior scalability, and flexibility work better with monolithic architectures.
2. **A critical software** .that will not have rapid changes and maintains, so it's better to be monolithic.
3. **Quick Launch.** If you want to develop your application and launch it as soon as possible, a monolithic model is the best choice.

C)Screen Shots:

1-web services

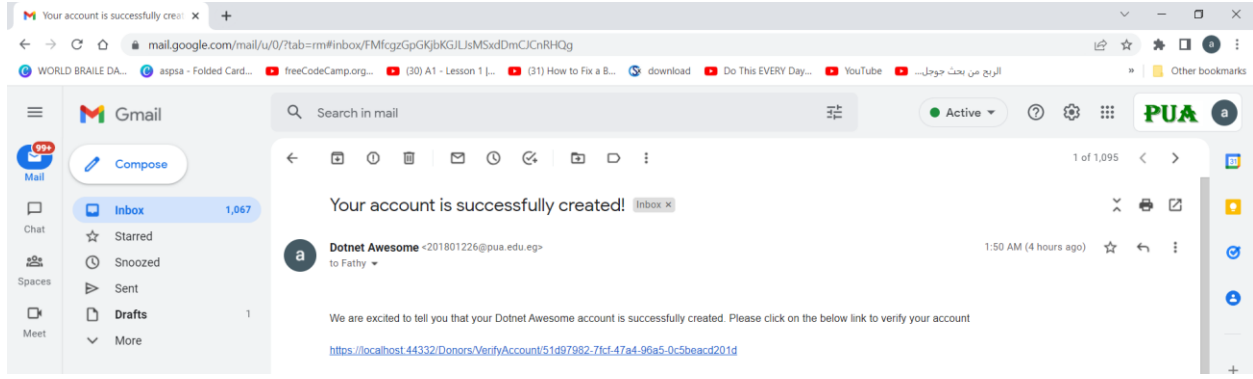


Figure 11 : Web Services

2-api

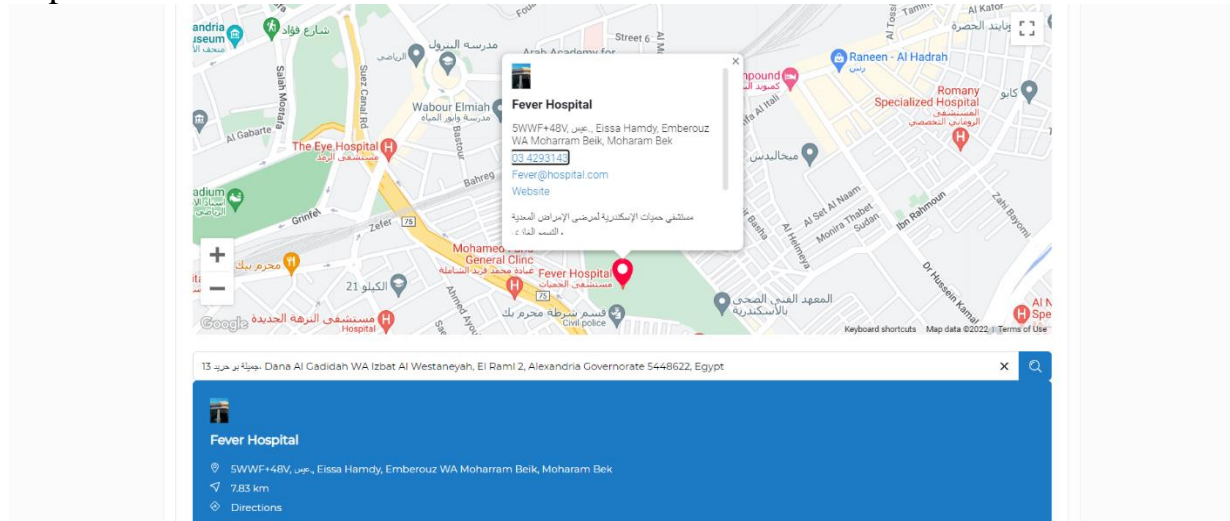


Figure 12 : Api

3-Home index

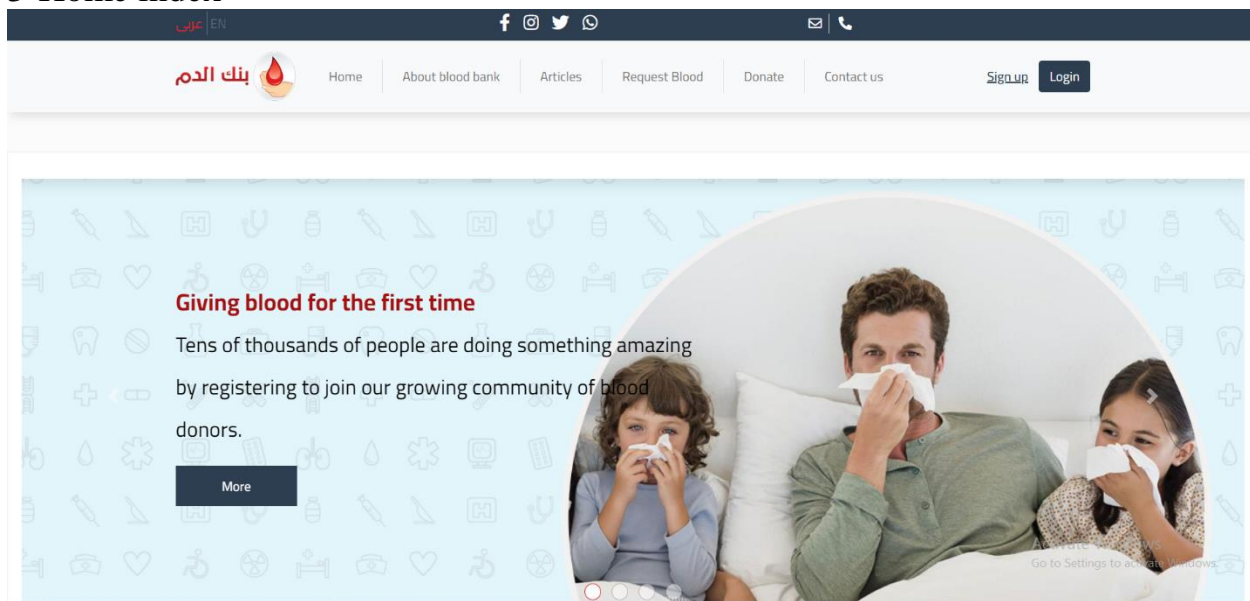


Figure 13 : Home Index

4-articles

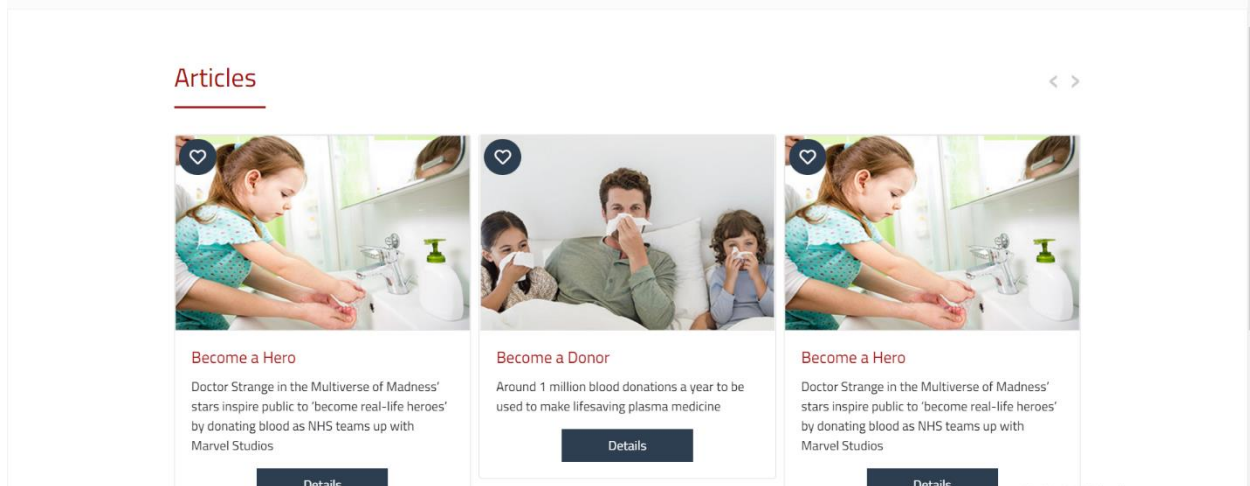


Figure 14 : Articles

5-bloodbag

The screenshot shows the 'Create' form for a blood bag. The header includes a language toggle (عربي | EN), a logo, and navigation links: Home, About blood bank, Articles, Dashboard, About us, and Contact us. There are also 'Sign up' and 'Login' buttons. The breadcrumb trail is 'Dashboard / BloodBag / Create'. The form contains the following fields:

- bloodtype**: A dropdown menu with 'A-' selected.
- D5sn**: A text input field containing 'mahmoud'.
- bank_id**: A dropdown menu with 'bloodbank' selected.
- BloodBag_Donation**: A date input field with the placeholder 'mm/dd/yyyy'.

Figure 15: Blood Bag

6-Dashboard

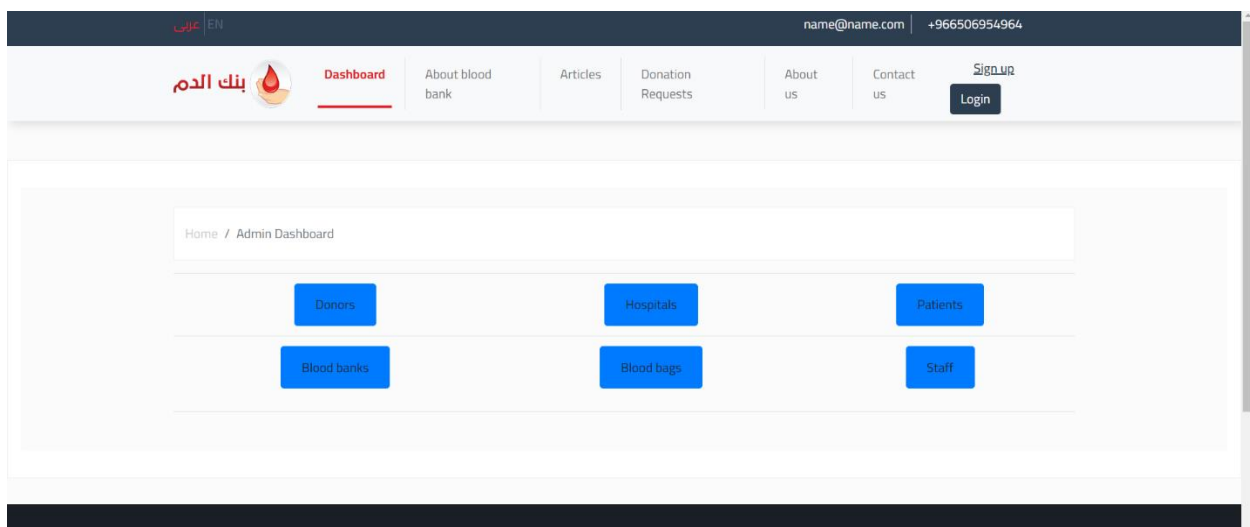


Figure 16 : Dashboard

4) Software Testing :

Software testing is a widely used quality-improvement activity, supported by both academic research and commercial experience. In his timeless classic, The Art of Software Testing, Myers offers a definition of software testing: “Testing is the process of executing a program with the intent of finding errors”

A)Test Case:

We had done 2 test cases on the web services to make sure the errors is gone and totally fix it

(Test case 1)

As it shown below we test 12 cases not only 10 to make sure for even small things trying to make the site efficient

So, there were many failure in the test so we was need to fix and improve the code to achieve best performance

Test case#	Test case description	Test data	Expected result	Actual result	Pass/Fail
1	Try to translate a home page from English to Arabic	Click on the عربي button	Translate it and remain on the same page	Translate it and remain on the same page	pass
2	Try to translate random pages from English to Arabic	Click on the عربي button	Translate it and remain on the same page	Translated it but back to the home page	Fail
3	Try to put incorrect day and month while filling the form	33/33	Doesn't accept it and convert it to a smaller number	Didn't accept it and converted it to 03/31	Pass
4	Try to put the incorrect year while filling the form	111111	Doesn't accept it and convert it to a smaller number	Accept it	Fail
5	Try to put the date in last time to donate doesn't come yet	01/30/3000	Doesn't accept	Accept it	Fail
6	Create donor	password	Create successfully	Created successfully	pass
7	Request to donate		Create successfully	Created successfully	pass
8	Create a staff		Create successfully	Created successfully	pass
9	Try to fill with wrong email spelling	123@gmail_cim	error	error	pass
10	Try to delete the user (donor, hospital)		Delete it and all its content	Deleted it and also delete everything linked with this user	pass
11	Show user details	Details button	Show all user's details	Show all user's details	pass
12	Edit user password	Password = sss	Show hashed password	Didn't hash the new password	fail

figure 17 : Test 1

(Test case 2)

As shown below after the first test we knew what the errors were and tried to fix them so can have the best performance .

Test case#	Test case description	Test data	Expected result	Actual result	Pass/Fail
1	Try to translate home page from English to Arabic	Click on عربي button	Translate it and remain in the same page	Translate it and remain in the same page	pass
2	Try to translate random page from English to Arabic	Click on عربي button	Translate it	Translated it	pass
3	Try to put incorrect day and month while fill the form	33/33	Doesn't accept it and convert it to smaller number	Didn't accept it and convert it to 03/31	Pass
4	Try to put incorrect year while fill the form	11111	Doesn't accept it and convert it to smaller number	Didn't accept it and convert it to 0000	pass
5	Try to put date in last time to donate doesn't come yet	01/30/3000	Doesn't accept	Doesn't accept it	pass
6	Create donor	password	Create successfully	Created successfully	pass
7	Request to donate		Create successfully	Created successfully	pass
8	Create a staff		Create successfully	Created successfully	pass
9	Try to fill with wring email spelling	123@gmail,cim	error	error	pass
10	Try to delete user (donor, hospital)		Delete it and all its content	Deleted it and also delete everything linked with this user	pass
11	Show user details	Details button	Show all user's details	Show all user's details	pass
12	Edit user password	Password = sss	Show hashed password	hash the new password	pass

figure 18 : Test 2

After we had 4 fails in the first test case we fix it and make it 0 fails

B)Unit Test:

Create and run unit tests to ensure that your code is operating as planned. Because you break down the functionality of your software into discrete testable behaviours that you can test as individual units, it's called unit testing. Visual Studio Test Explorer is a versatile and quick way to run unit tests in Visual Studio and view their results. The Microsoft unit testing frameworks for managed and native programmers are installed by Visual Studio. Create unit tests, execute them, and report the results of these tests using a unit testing framework. When you make changes to your code, rerun unit tests to ensure that it is still operating properly.

Live Unit Testing in Visual Studio Enterprise can do this for you automatically, detecting tests that are affected by your code changes and running them in the background as you type.

When unit testing is an intrinsic part of your software development workflow, it has the biggest impact on the quality of your code. Create unit tests that validate the behavior of the code in response to standard, boundary, and wrong cases of input data, as well as any explicit or implicit assumptions made by the code, as soon as you write a function or other block of application code. You write the unit tests before you write the code in test driven development, so you can use them as both design documentation and functional requirements.

You may generate test projects and test methods from your code rapidly, or you can create the tests manually as needed. You can generate test data and a suite of unit tests when you use IntelliTest to explore .NET code. A test input is generated for each statement in the code that will execute that statement.

We try to make unit test for Donor:

- 1-Create method.
- 2-Delete method.
- 3-Details method.
- 4-Edit method.

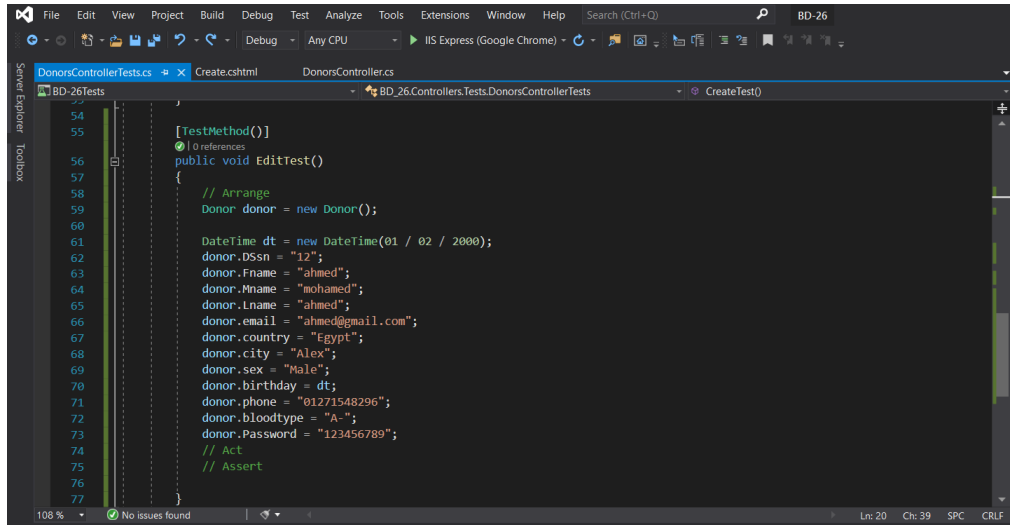


figure 19 : edit test

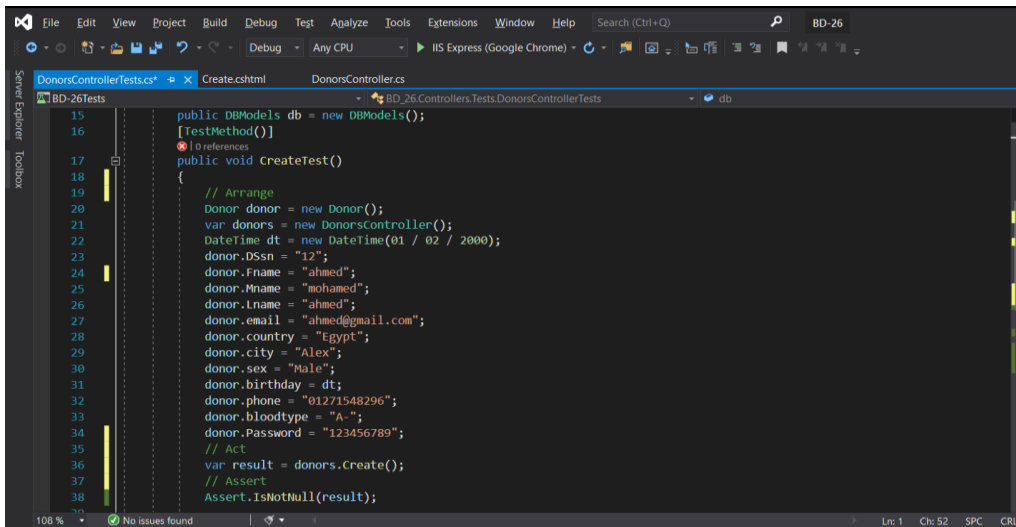


Figure20: Create Test

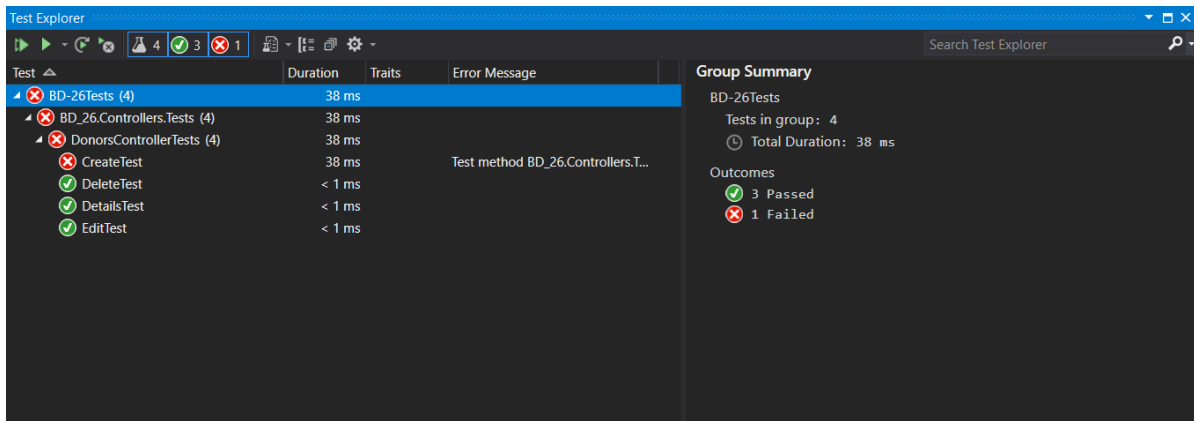


figure 21: Result of Testing

- Delete , Details , edit methods → Passed
- Create method → Failed

Postman :

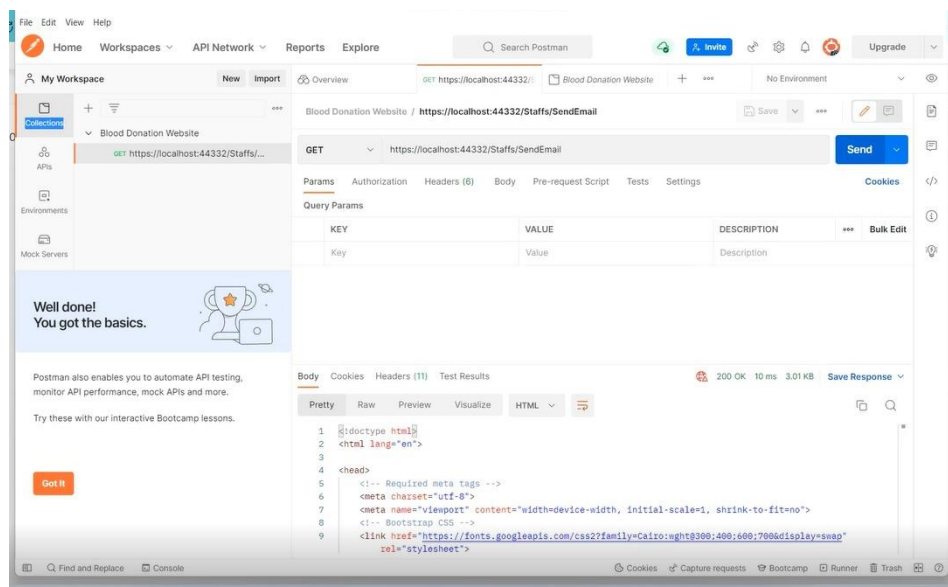


figure 22: Postman Test

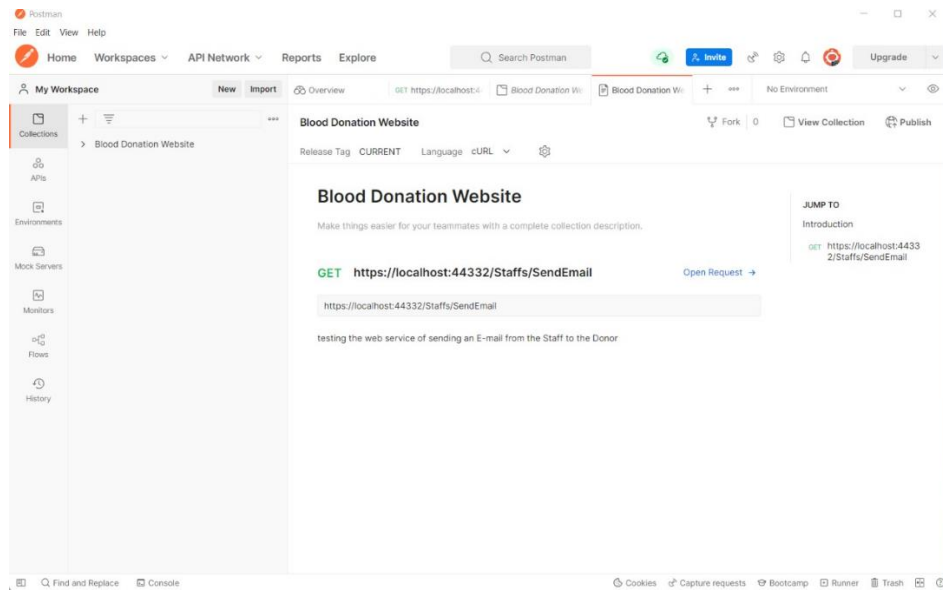


figure 23: Result of Testing

Conclusion:

Due to lack of voluntary blood donation, blood seekers have to manage blood from professional blood donors. This source most often fails to provide fresh blood and costly too. On the other hand, these blood units carry toxic elements which is dangerous for patients. As a result, a number of patients die every year. Managing blood is quite costly and difficult for blood seekers although a great portion of donors donate blood voluntarily. Lack of information and communication is the main cause of difficulty and unavailability of blood in our country. Besides, ignorant of the benefits of blood donation is another cause.

Computers are gradually becoming accepted in about every field of life, like business environment, health, industries, and research environment. Within these application areas, online systems appear to have become most suitable for health care and life-saving processes. The proposed system is able to manipulate these real facts. These analyses reports show that most people are unaware of the utility of such activities. In this context seminars and wide publicity are required both in male and female. This system can be extremely useful to patients, doctors, and researchers.

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- 1) Jiisun1.M , Rupa.R “Blood Donation Systems in Bangladesh: Problems and Remedy” . Center of Science and Education ,Bangladesh,2019.
- 2) Khan.A, Qureshi.M “Web-Based Information System for Blood Donation”. Gomal University, Pakistan,2009.