Cloud Microservices and Applications Research Paper:

Sem - V Project on *E-blood Donation and Management*, 3rd edition

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Cloud Microservices and Applications

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Summary

Abstract

The process of managing the blood bag that's received from the blood donation events needs proper and systematic management. The blood bag must be handled with care and treated thoroughly because it is said to be someone's life. the event of an E-Blood Donation and Management (EDM) is proposed to supply a management function to the bank to handle the blood bag. In Rotary Blood Bank Panvel, Navi Mumbai, Maharashtra has just one government hospital that handles blood banks currently is employing a standalone system. This web-based management system was developed to satisfy the requirements for all the resident's hospitals. Other hospitals may have alternative ways and approaches of handling blood bags. The methodology want to build this technique uses the Rational Unified Process (RUP). The technology platform in implementing this technique uses Word press for website development, SQL for management, and Heroku for Cloud management.

Introduction

A bank may be a place where a blood bag that's collected from blood donation events is stored in one place. The term "blood bank" refers to a division of a hospital laboratory where the storage of blood products occurs and where proper testing is performed to scale back the danger of transfusion-related events.

Pathology Department is one of the foremost important departments within the Rotary Blood Bank Panvel (RBBP). It processes blood which will be supplied to the patients in RBBP consistent with their needs. Before the blood is supplied to the patients, the blood will undergo several tests to make sure that the blood receiver isn't infected by serious dis- eases. a couple of units are operating during this department like the Blood House Unit, transfusion Unit, and Blood Distribution Unit.

Every month, RBBP will organize a blood donation event which is one of the ways they will increase the bloodstock. After the blood donation events, the blood bags that they obtained will undergo tests. All the blood received at the blood donation events must be managed thoroughly and systematically to avoid patients who need the blood infected by any viruses or diseases.

E-blood Donation and Management (EDM) may be a web-based system that will assist the knowledge of blood bags during its handling within the bank. With this technique, the user of this technique can key within the results of a biopsy that has been conducted to every of the blood bags received by the bank. The results of the test will indicate whether the blood bag is often delivered to the patient or not.

From this technique, there are several sorts of reports which will be generated like bloodstock reports, donor's gender reports, and therefore the total of blood donations consistent with months and years. The system can also give information to the donor about blood analysis test results for every time the donor contributes. Hence, EDM will make the bank stock more systematic and manageable.

Problem Statement

The percentage of individuals donating blood is increasing day by day thanks to awareness to donate blood for those needed. The blood received need to be managed thoroughly in order that there will be no negative effect on the blood receiver once they received blood.

From the observations and interviews conducted that are made during the user requirements phase, it was found out that there's no interaction medium between RBBP and therefore the public to announce their blood donation schedule. The blood donation event schedule is generally advertised to the public in order that they're conscious of the blood donation campaign period. At the blood house unit, the staff and nurses only are informed about the blood donation schedule for every month on the whiteboard at the blood house. In order that they are using manual way in informing the schedule. the matter arises when the space provided isn't enough.

The medium wants to inform the staff about the schedule of the month is using awhiteboard and it's written by using a whiteboard marker. Therefore, the writing tends to become unclear. the public didn't have knowledge about blood donation. There are brochures distributed to the donor but to not the public because they are only

available at blood donation houses. Hence, the public isn't getting any detailed information about blood donation unless they are going to the blood donation house.

To oversee these, the EDM interface is going to be constructed to cater for the blood house staff to post about the blood donation events. These details are often viewed by the public in order that they know and that they can allocate a while to go and donate their blood. to make sure that the blood donation event schedule is informed among the blood house staff, there will be an interface for workers to be ready to fill in details and a list of the location of the blood donation events for each month. The info inserted are going to be showing the opposite blood donation staffs like the nurse in order that everyone can be notified about the blood donation event schedule albeit the staff aren't available at the RBBP. By having this function in EDM, it's easier for the blood staff to form any correction if there are any incorrect details and make any changes if there are any changes in location or specified date.

One of the factors of the public being afraid to donate their blood is that they believe myths. The myths that they always believe are if they donate their blood, they'regoing to become fat and if they donate their blood, their blood will become less in a total of the amount and that they will become pale. This EDM should provide more information to teach the public in order that they know blood donation won't give bad effects. By giving awareness to the public, will increase volunteers to donate their blood.

Literature Review

For our proposed system we have considered the National Blood bank Website and Panvel Rotary Club Blood Bank System.

Current System

E - rakt kosh, blood cell by NHM (National Health Mission) was Inaugurated on 7th April 2016 by Hon'ble Minister of Health and Family Welfare, Sh. J P Nadda. E - Rakt Kosh enforces Drug Cosmetic Act, National blood policy standards and guidelines ensuring proper collection donation, effective management and monitoring the quality and quantity of the donated blood. It is an ambitious project to digitize and centralize blood banks across country for various objectives leading to smooth functioning for the welfare of patients.

The salient features of the E-Rakt Kosh web-application are:

1. Aadhar Linkage
2. Decision Support
3. Statutory Reports
4. Guideline Enforcement's

Various features like blood availability, camp schedules and nearby blood banks can be located using the portal. Apart from all this, registration of individual donor to track and maintain the profile is also possible. Most blood banks in the country have adopted it but there are ground realities that act as barriers in full implementation and adoption of this program.

Drawbacks of Current System

A compilation of all the issues that came up while using the portal are stated.

1. Not updated properly
2. Only the government hospitals are updated occasionally
3. Most of the places show no availability
4. No proper data available for camps
5. No SMS system hence need to check website for updates.

These issues are caused due to various incompetency in work and application. The key obstacles to effective online participation under e-Rakt Kosh portal were found that directly or indirectly affected the performance of the portal.

Main problems were a result of lack of appropriate staff for the work. Singe time training of a single staff was another problem. Lack of regular training in the initial year of the implementation was a setback. No option for simultaneous collaborative online work is also a limiting factor. Coupled with weak and interrupted internet speed or electricity, backlog from inadequate entries due to manpower deficit was later recognized as important barrier in the long run.

All these reasons lead to many blood banks not updating on a regular basis and hence making the portal less useful for the public. In total we have shortlisted 7 major reasons for reduced efficiency of the portal

1. Lack of dedicated workforce
2. Lack of adequate training
3. The program is not user friendly

4. Lack of adequate number of computers
5. Disruption of net or electricity
6. Backlog of entries
7. No knowledge of free troubleshooting support

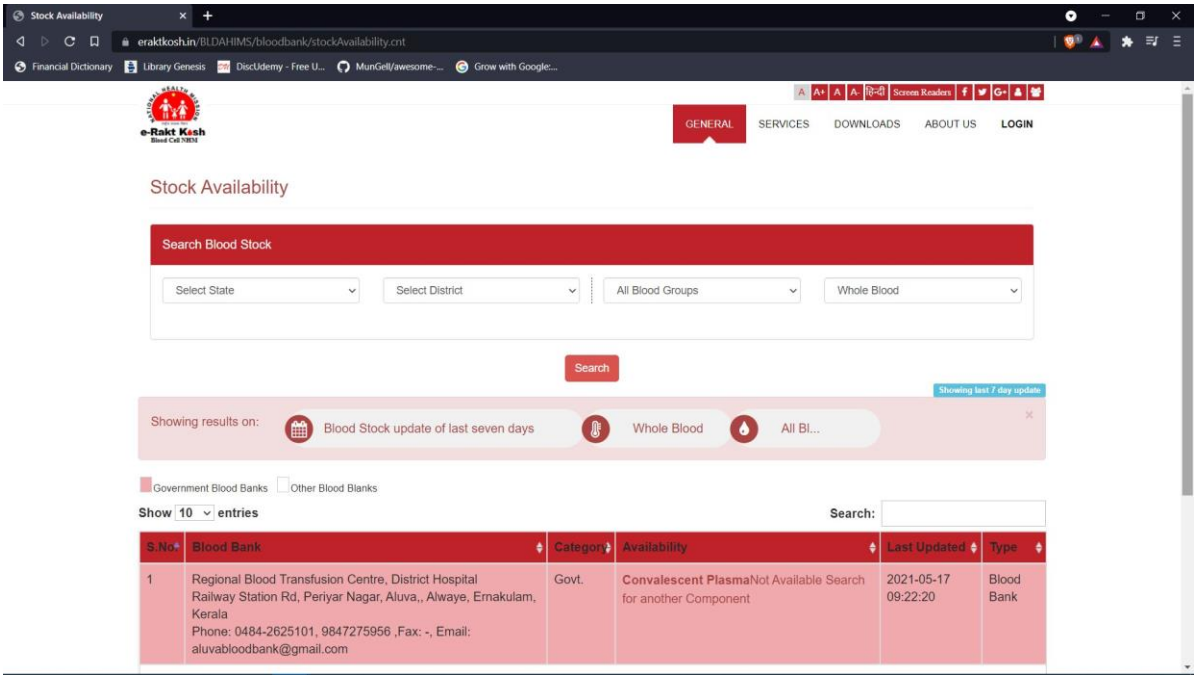

Fig 1.0

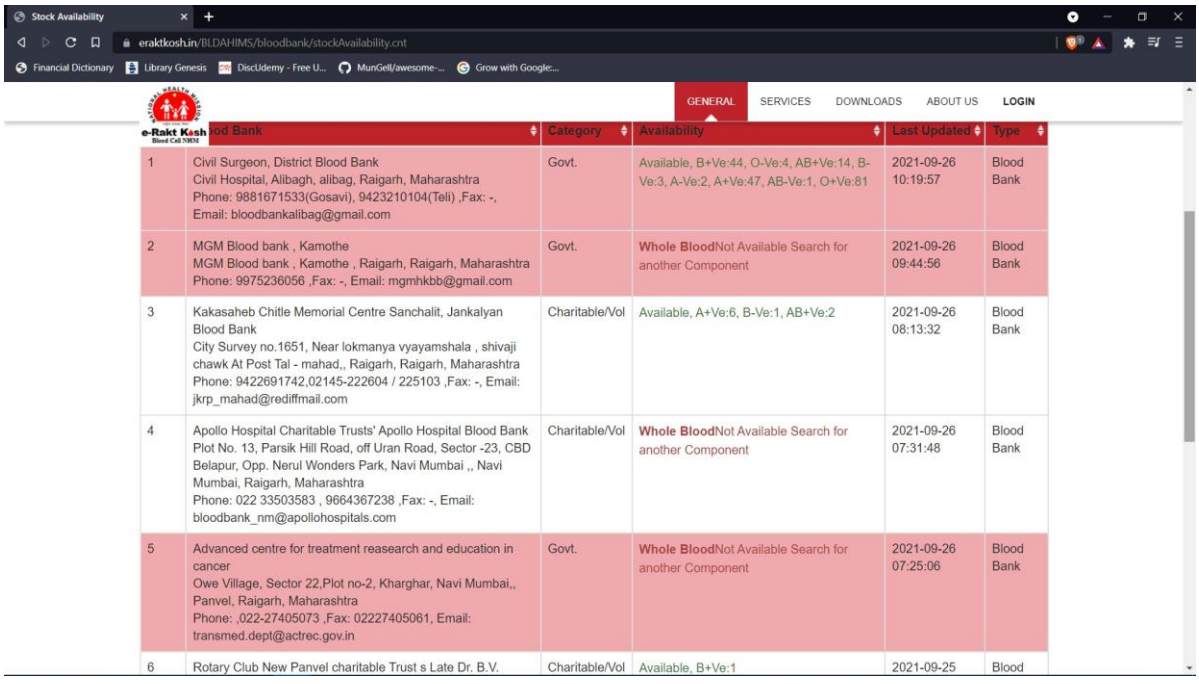

Fig 2.0

Proposed System

The proposed EDM system is designed to help the Blood Bank administrator to meet the demand of Blood by sending and/or serving the request for Blood as and when required. The proposed system bridges the gap between Recipient, Donor, and Blood Banks. This application will provide a common ground to the Recipient, Donor, and Blood Banks and will ensure the fulfillment of demand for Blood requested by Recipient and/or Blood Bank.

The EDM system overcomes the drawbacks in the following way:

1. The architecture that is used in this website is Platform as a Service (PaaS) which will help in rapid addition capacity in peak times and scale down as needed. It will also provide the in-house development team new capabilities, eliminating the need to hire skilled staff or outsource activities.
2. PaaS will help in getting development options for multiple platforms, such as desktop and mobile apps. The platform used will be used to build one application that can be deployed across multiple channels, including a range of connected devices such as mobiles and desktops which makes it a fast and cost-effective approach enabling scalability.
3. Cloud computing will help in accommodating data storage with large capacity. Every hospital and personal users are connected through internet service to the cloud server. This would help and increase effectiveness and efficiency of hospital or patient when blood donation is needed. They can directly check and will get the information about blood supply they need and the nearest location they can get for the blood.

Methodology

Introduction

E-blood Donation and Management (EDM) is a web-based system with an integrating SMS alert function that is implemented using API, which aims to educate the community on the benefits of blood donation, develop a Web-Based Blood Bank System to manage the records of donors and recipients, and persuade voluntary blood donation, to access information about blood type and the distribution of the blood in various hospitals in Navi Mumbai, based on the hospital needs. The system is developed by using WordPress for website development, SQL for database management, and Heroku for Cloud management. The Methodology used to develop and build the web-based system uses the Rational Unified Process (RUP). Blood donors can register on the system and it will provide a donor an ID. Blood campaign organizers can organize a campaign online. The request is sent to the

blood bank officer and the officer can approve or reject the request. Once he/she approves the campaign, donors may get SMS notifications to their mobile by informing the campaign. Patients can request blood online or just by sending an SMS to the system. Then the system will inform all the relevant donors of the request. Bloodstock will be handled day by day through the system. A blood bank officer can add or remove a donor to the system and from the system. Also, he can add bloodstock to the relevant blood bank. The blood Bank Management system has a separate Admin panel. Administrators can view island-wide bloodstock either as a blood group or branch. Furthermore, the administrator can add a new bank to the system as well as a user to the system. The system targets three types of user which are the public who wants to donate blood, the recipients who need the donated blood, and the hospitals who that work as an intermediary to manage the communication between the donors and recipients.

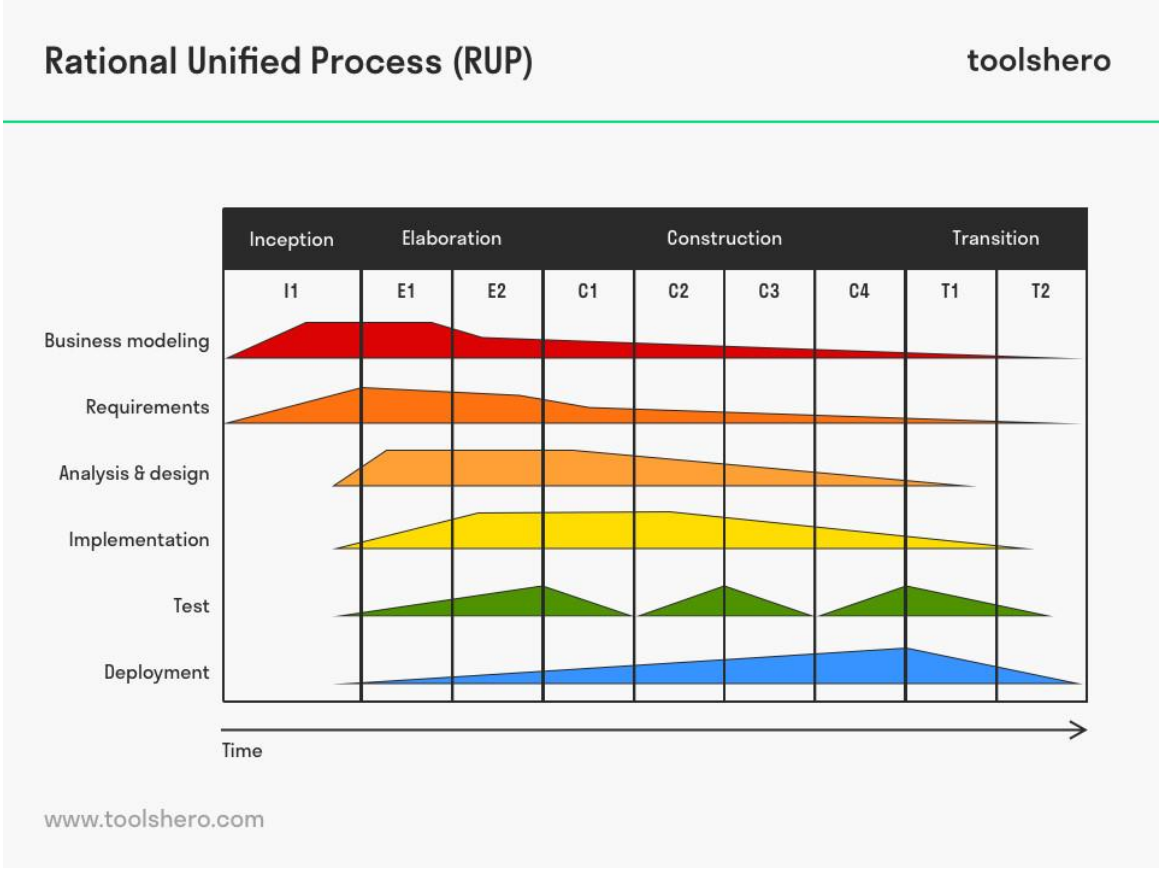

Fig 3.0

Fig 3.0 illustrates how the relative emphasis of different disciplines changes over the course of the project that are chosen in developing this project. The Unified Process is an iterative and incremental development process.This model has been selected because project can be developed through cycle of phase. The development of the project is that it must follow the phase that is a phase at a time. If there is any correction, it can be done in the middle of the process. Incremental model included five phases which are requirement analysis, design, implementation and unit testing, integration and system testing and operation.

Methodology Justification

The RUP model is chosen to develop this project because of these some factor:

1. Architecture-Centric

   Since no single model is sufficient to cover all aspects of a system, the Unified Process supports multiple architectural models and views. One of the most important deliverable of the process is the executable architecture baseline which is created during the Elaboration phase. This partial implementation of the system serves to validate the architecture and act as a foundation for remaining development.

2. Risk-Focused

   The Unified Process requires the project team to focus on addressing the most critical risks early in the project life cycle. The deliverable of each iteration, especially in the Elaboration phase, must be selected to ensure that the greatest risks are addressed first.

3. Security

   The model is more organized and easy to understand the flow.

4. Flexibility

Allow to have changes happen in the middle of the process, the system still can be implemented and proceed so that all the modules that want to be achieved is success.

5. Saves Time

As the system that is developed using the cyclic model, the developing of the project can be continuously done although there is some error in the middle of the process.

Project Life Cycle

Phase I: Inception

During the first phase, the basic idea and structure of the project are determined. In this phase, the project's necessity, but also its viability and suitability are determined. Viability and suitability also include the expected costs and the means needed to complete the project after the green light has been given. Also before this phase, all the materials that are required have been prepared.

1. Hardware
    a) Personal Computer (PC)
2. Software
    a) Google Chrome
    b) PHP
    c) HTML
    d) JS
    e) XAMPP
    f) Microsoft Office
    g) MySQL Server

h) G-Cloud

The result of the first phase is:

- First use case
- UI/UX Design Wireframe
- Financial prognosis
- Risk assessment
- Project plan
- Prototypes

Phase II: Elaboration

During the elaboration phase, the system's requirements and its required architecture are assessed and analyzed. This is where the project begins to take shape. The objective of the elaboration phase is to analyze products and to lay a foundation for the future architecture.

Results of the elaboration phase include:

- Use case (100% completed)
- Description of the feasible architecture
- Project development plan
- Prototypes for tackling risks
- User manual

Phase III: Construction

In the construction phase of the Rational Unified Process (RUP), the software system is constructed in its entirety. The emphasis is on the development of components and other features of the system. Most of the coding also takes place in this phase. In this production process, the emphasis is on managing costs and means, as well as ensuring quality.

Results from the production phase include:

- Fully completed software system
- User manual

Phase IV: Transition

The objective of the transition phase is to transfer the product to its new user. As soon as the user starts using the system, problems almost always arise that require changes to be made to the system. The goal, however, is to ensure a positive and smooth transition to the user.

Results and activities in the last phase:

- Beta Testing
- Conversion of Existing user databases
- Training New Users
- Rolling out projects to make market and distribution

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
☐	2	UserName	varchar(100)	latin1_swedish_ci		No	None			Change Drop More
☐	3	Password	varchar(100)	latin1_swedish_ci		No	None			Change Drop More
☐	4	updationDate	timestamp			No	0000-00-00 00:00:00		ON UPDATE CURRENT_TIMESTAMP()	Change Drop More

Fig 3.0 Admin Database

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
☐	2	FullName	varchar(100)	latin1_swedish_ci		Yes	NULL			Change Drop More
☐	3	MobileNumber	char(11)	latin1_swedish_ci		Yes	NULL			Change Drop More
☐	4	EmailId	varchar(100)	latin1_swedish_ci		Yes	NULL			Change Drop More
☐	5	Gender	varchar(20)	latin1_swedish_ci		Yes	NULL			Change Drop More
☐	6	Age	int(11)			Yes	NULL			Change Drop More
☐	7	BloodGroup	varchar(20)	latin1_swedish_ci		Yes	NULL			Change Drop More
☐	8	Address	varchar(255)	latin1_swedish_ci		Yes	NULL			Change Drop More
☐	9	Message	mediumtext	latin1_swedish_ci		Yes	NULL			Change Drop More
☐	10	PostingDate	timestamp			No	current_timestamp()			Change Drop More
☐	11	status	int(1)			Yes	NULL			Change Drop More

Fig 4.0 Blood Donors Database

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	int(11)			No	*None*		AUTO_INCREMENT	Change Drop More
2	BloodGroup	varchar(20)	latin1_swedish_ci		Yes	*NULL*			Change Drop More
3	PostingDate	timestamp			No	current_timestamp()			Change Drop More

Fig 5.0 Blood Groups Database

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2	Address	tinytext	latin1_swedish_ci		Yes	*NULL*			Change Drop More
3	EmailId	varchar(255)	latin1_swedish_ci		Yes	*NULL*			Change Drop More
4	ContactNo	char(11)	latin1_swedish_ci		Yes	*NULL*			Change Drop More

Fig 6.0 Contact Us Database

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
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2	name	varchar(100)	latin1_swedish_ci		Yes	*NULL*			Change Drop More
3	EmailId	varchar(120)	latin1_swedish_ci		Yes	*NULL*			Change Drop More
4	ContactNumber	char(11)	latin1_swedish_ci		Yes	*NULL*			Change Drop More
5	Message	longtext	latin1_swedish_ci		Yes	*NULL*			Change Drop More
6	PostingDate	timestamp			No	current_timestamp()			Change Drop More
7	status	int(11)			Yes	*NULL*			Change Drop More

Fig 7.0 Contact Us Query Database

Website Snippets

Fig 8.0 Homepage

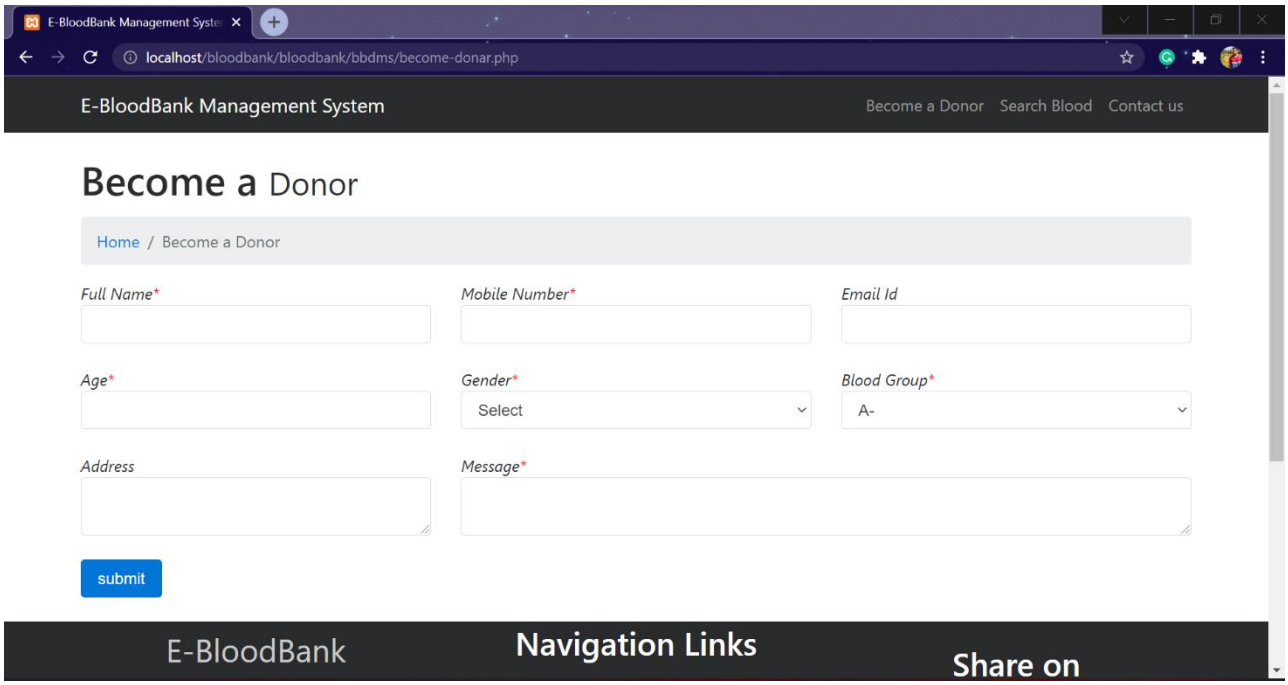

Fig 9.0 Become a Donor

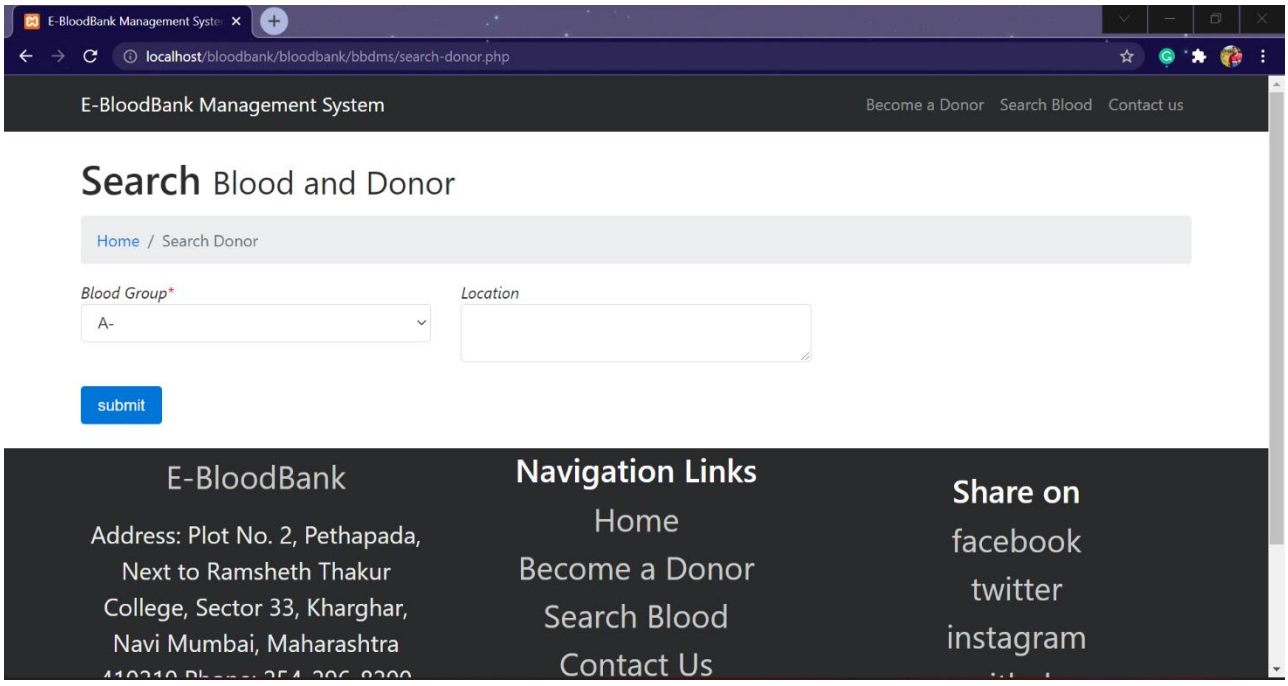

Fig 10.0 Search Blood

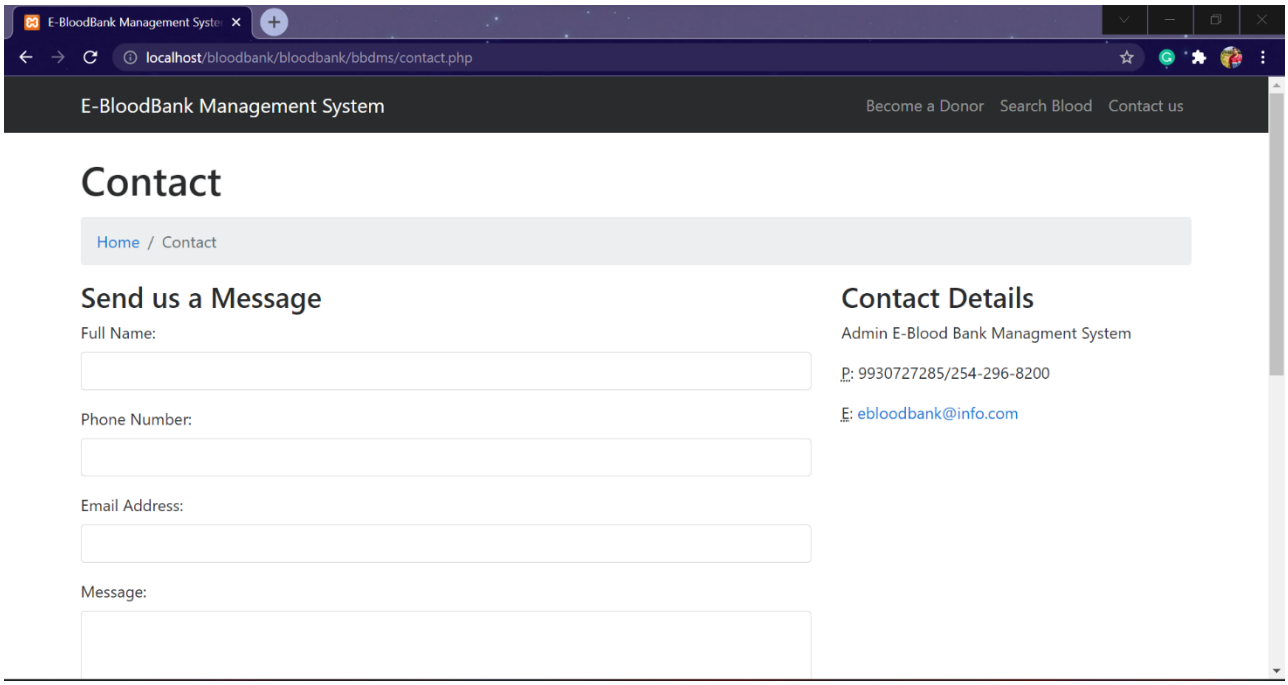

Fig 11.0 Contact Us

Conclusion

The EDM has been developed according to the user requirements to make sure that the management of the blood stock becomes effective and systematic. The functional services provided in the current version are Blood Inventory Analysis, profile management (both Donor and Hospital), Blood Donation camps notifications and SMS services for verification and security purposes. The next phase of the EDM we plan to have an application compatible both with Android and iOS operating system, along with extra features which we plan on designing and developing along with changing time.

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