IMPLEMENTATION OF BLOOD BANK SERVICES BASED ON CLOUD COMPUTING

Ashvini Ramteke, Akanksha Puppalwar, Aayushi Ramdham, Mayuri Chatarkar,
Prof. Sugandha Satija
Department of Information technology, Kavikulguru Institute of Technology & Science, Ramtek, India

ABSTRACT: Blood Donation and Blood Transfusion Services (BTS) are crucial for saving people's lives. Blood banks suffer frequent shortage of blood. We wish to develop an application that provides the information about the nearest blood donor. This application will not only display the list of donors but also facilitate with tracking the location of the nearby donors and providing SMS alerts to them, so that the patient can be serve with blood soon. In order to donate blood through the application, one has to register himself by providing all the required details. These details must be valid and true so that they can be tracked at the time of emergency. GPS module is included in order to locate the donors. Cloud- based services are proved very vital in urgent blood delivery as we are able to centralized and immediate access to donor's data and location from anywhere and anytime.

Keywords: Cloud Computing, GPS, Haversine formula, Dijkstra's algorithm.

INTRODUCTION:

In many emergency cases (accident, surgeries, etc.) there could be an urgent need for specific blood type then the victim's family seek for the blood at various places such as hospitals, relatives etc. In hospitals, efficiency of blood or particular group of blood not available that time hospital contact other blood bank or patient's relative. One of the most important challenges i.e. to provide quick services in the emergency situations. By developing an applications which will help hospital and various needy people is the application of E-Blood bank which will provide a quick service to the needy people. In this applications the donors locations will be tracked using GPS system. If blood is required, the donor with the required specific blood group is identified elative contact other blood bank. The project consists of algorithm which tracks locations of the donors, identifies the donors who are nearby to the location of the requestor and notifies them too. If the identified nearby donors are not able to donate blood at present then the scope of tracking the donors is increase.

Cloud computing

Cloud computing has become one of the most discussed IT paradigms of recent years. It builds on many of the advances in the IT industry over the past decades and presents significant opportunities for businesses to shorten time to market and reduce costs by consuming shared computing and storage resources rather than building, operating , and improving infrastructure on their own. The speed of change in markets creates significant pressure on the enterprise IT infrastructure to adapt and deliver. As defined by Gartner 1,"Cloud computing is a style of computing where scalable and elastic IT-enabled capabilities are delivered as a services to external customers using Internet technologies."

Cloud computing is shared pools of configurable computer system resources and higher-level services that can be rapidly provisioned with minimal management effort, often over the Internet. Cloud computing relies on sharing of resources to achieve coherences and economies of scales, similar to a public utility.

Cloud Models:

There are four different models that you can subscribe according to business needs:

a) Private Cloud:

Here computing resources are deployed for one particular organization. This method is more used for intra-business interactions. Where the computing resources can be governed, owned and operated by the same organization.

b) Community Cloud:

Here computing resources are provided for a community and organizations.

c) Public Cloud:

This type of cloud is used for B2B (Business to Consumer) types interactions. Here the computing resource is owned, governed and operated by government, an academic or business organization.

d) Hybrid Cloud:

This type of cloud can be used for both type of interactions-B2B (Business to Business) and B2C (Business to Customer). This deployment method is called hybrid cloud as the computing resources are bound together by different clouds.

Types of Cloud Services:

The three major Cloud Computing offerings are:

- Software as a Service (SaaS).
- Platform as a Service (PaaS).
- Infrastructure as a Service (IaaS).

Different business use some or all of these components according to their requirement.

a) SaaS (Software as a service)

SaaS is relatively mature, and the phrase's use predates that of cloud computing. Cloud applications allow the cloud to be leverages for software architecture, reducing the burdens of maintenance, support, and operations by having the applications run on computers belonging to the vender. Gmail and Salesforce are among examples of SaaS run as cloud, but not all SaaS has to be based in cloud computing.

b) PaaS (Platform as a Service)

PaaS clouds are created, many times inside Iaas Clouds created, many times inside IaaS Clouds by Specialists to render the scalability and deployment of any applications trivial and to help make your expenses scalable and predictable. Some examples of a PaaS system includes: Mosso, Google App Engine, and Force.com. The chief benefits of a service like this is that for as little as no money you can initiate your application with no stress more than basic development and maybe a little porting if you are dealing with an existing app. Furthermore, PaaS allows a lot of scalability by design because it is based on cloud computing as defined earlier in the article. If you want a lean operations staff, a PaaS can be very useful if your app will capitulate.

c) IaaS (Infrastructure as a Service)

Iaas gives business access to vital web architecture, such as storage space, servers, and connections, without the business need of purchasing and managing this internet infrastructure themselves.

Because of the economies of scale and specialization involved, this can be to the benefits of both the business providing the infrastructure and the one using it. In particular, IaaS allows us an internet business a way to develop and grow on demand. Both PaaS and SaaS clouds are grounded in IaaS clouds, as the company providing the software as service is also providing the infrastructure to run the software.

HAVERSINE:

The haversine formula determines the great-circle distance between two points on a sphere given their longitudes and latitudes. Important in navigation, it is a special case of a more general formula in spherical trigonometry, the law of haversine that relates the sides and angles of spherical triangles. The first table of haversine in English was published by James Andrew in 1805, but Florian Cajori credits an earlier use by José de Mendoza y Ríos in 1801. The term haversine was coined in 1835 by James Inman. These names follow from the fact that they are customarily written in terms of the haversine function, given by haversine (θ) = sin2 (θ/2). The formulas could equally be written in terms of any multiple of the haversine, such as the older haversine function (twice the haversine). Prior to the advent of computers, the elimination of division and multiplication by factors of two proved convenient enough that tables of haversine values and logarithms were included in 19th and early 20th century navigation and trigonometric texts. These days, the haversine form is also convenient in that it has no coefficient in front of the sin2 function. Given a unit sphere, a "triangle" on the surface of the sphere is defined by the great circles connecting three points: u, v, and w on the sphere. If the lengths of these three sides are a (from u to v), b (from u to w), and c (from v to w), and the angle of the corner opposite c is C, then the law of haversine states: Since this is a unit sphere, the lengths a, b, and c are simply equal to the angles (in radians) subtended by those sides from the center of the sphere (for a non-unit sphere, each of these arc lengths is equal to its central angle multiplied by the radius of the sphere).

In order to obtain the haversine formula of the previous section from this law, one simply considers the special case where u is the North Pole, while v and w are the two points whose separation d is to be determined.

In that case, a and b are π/2 − φ1,2 (i.e., 90° − latitude), C is the longitude separation Δλ, and c is the desired d/R. Noting that sin(π/2 − φ) = cos(φ), the haversine formula immediately follows. To derive the law of haversine, one starts with the spherical law of cosines: As mentioned above, this formula is an ill-conditioned way of solving for c when c is small. Instead, we substitute the identity that cos(θ) = 1 − 2 haversine(θ), and also employ the addition identity cos(a − b) = cos(a)cos(b) + sin(a)sin(b). If you have two different latitude – longitude values of two different points on earth, then with the help of Haversine Formula, you can easily compute the great-circle distance (The shortest distance between two points on the surface of a Sphere). The term Haversine was coined by Prof. James Inman in 1835. Haversine is very popular and frequently used formula when developing a GIS (Geographic Information System) application or analyzing path and field.

PROPOSED APPROACH:

The proposed system is helps to the patient or seeker to get the nearest blood bank address. Thus the proposed system is completely different from existing system. The system uses Haversine formula to calculate the distance between blood bank and donor's location.

Blood banks and their donor's calculation is stored in a matrix table to find the donor or blood bank location. It will guide the donor to search for the nearest blood bank to donate their blood, developed Optimal Facility for Location Tracking of Blood Bank and Donor. The system uses the combination of Haversine formula and Dijkstra's algorithm. The former is used to calculate the closest blood bank based on user's location.

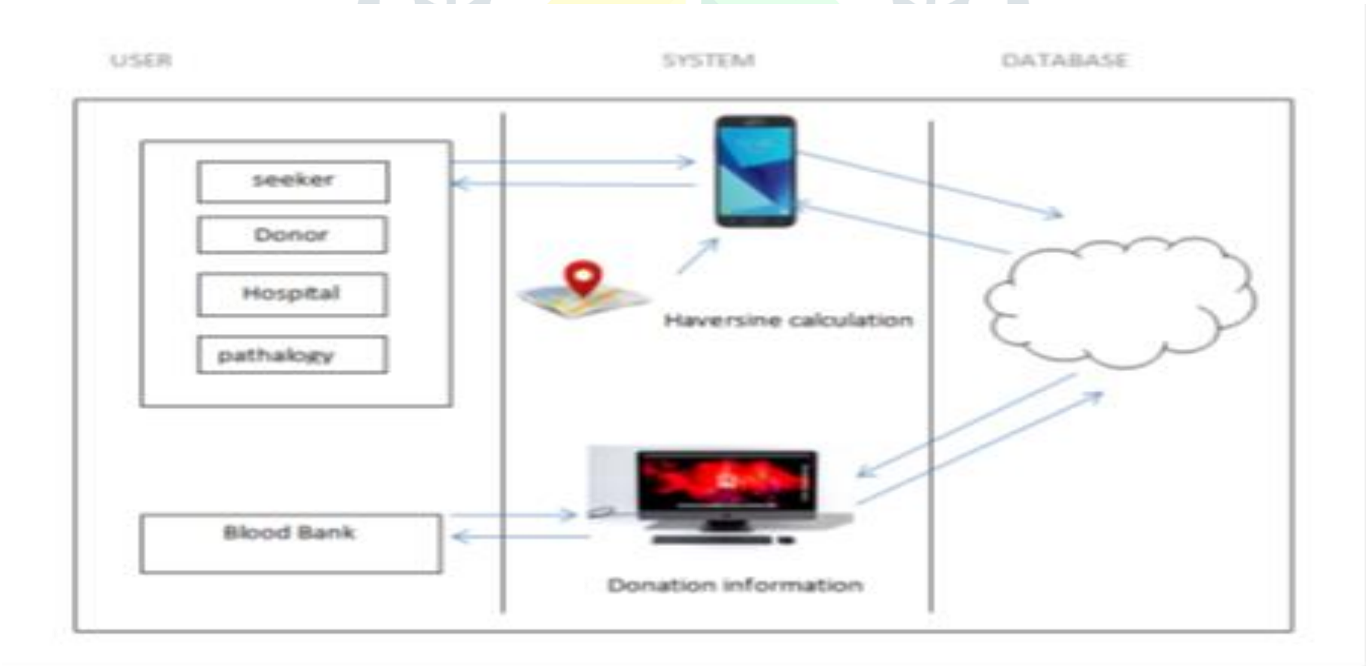


Fig: System architecture of blood bank

The system is used to calculate nearest blood banks in case the previous blood bank is not available to accept blood donations.

Following are the feature of system:

- Blood storage and effective blood management.
- Healthy blood will be provided.
- All the process of submission of registration form is quite simple.
- Department can contain information regarding various blood groups.
- Information gathering
- Requirement analysis
- Acquiring and installing the tool required
- Designing graphical user interface
- Coding
- Testing to the blood banks.

The above system architecture gives the brief idea about the proposed approach of application. It is an application which provides interface to the user. In this system various users are available like seeker, donor, hospital, pathology and blood bank. Blood bank having information regarding the blood donor. In the system we calculate the distance between calculate the distance between the seeker and the blood bank using Haversine, GPS and Dijkstra's algorithm.

HAVERSINE FORMULA:

The haversine formula determines the great-circle distance between two points on a sphere given their longitudes and latitudes. Important in navigation, it is a special case of a more general formula in spherical trigonometry, the law of haversine that relates the sides and angles of spherical triangles.

$$d = 2r\sin^{-1}\left(\sqrt{\sin^2\left(\frac{\Phi_2-\Phi_1}{2}\right) + \cos(\Phi_1)\cos(\Phi_2)\sin^2\left(\frac{\lambda_2-\lambda_1}{2}\right)}\right)$$

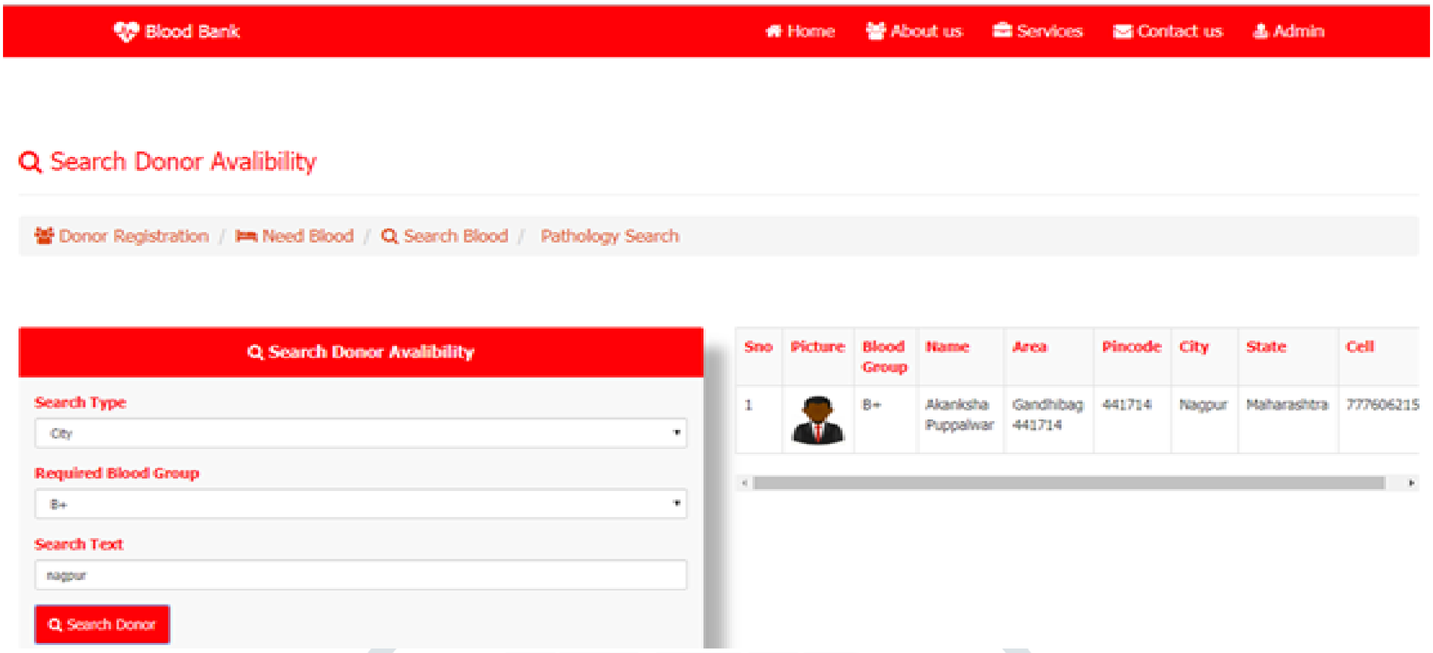
where, d is the distance between two points with longitude and latitude (ψ, φ) . r is radius . (φ2-φ1) is latitude of the two points. (λ2-λ1) is longitude of the two points.

The haversine formula is a very accurate way of computing distances between two points on the surface of a sphere using the latitude and longitude of the two points. The haversine formula is a re-formulation of the spherical law of cosines, but the formulation in terms of haversine is more useful for small angles and distances. One of the primary applications of trigonometry was navigation, and certain commonly used navigational formulas are stated most simply in terms of these archaic function names.

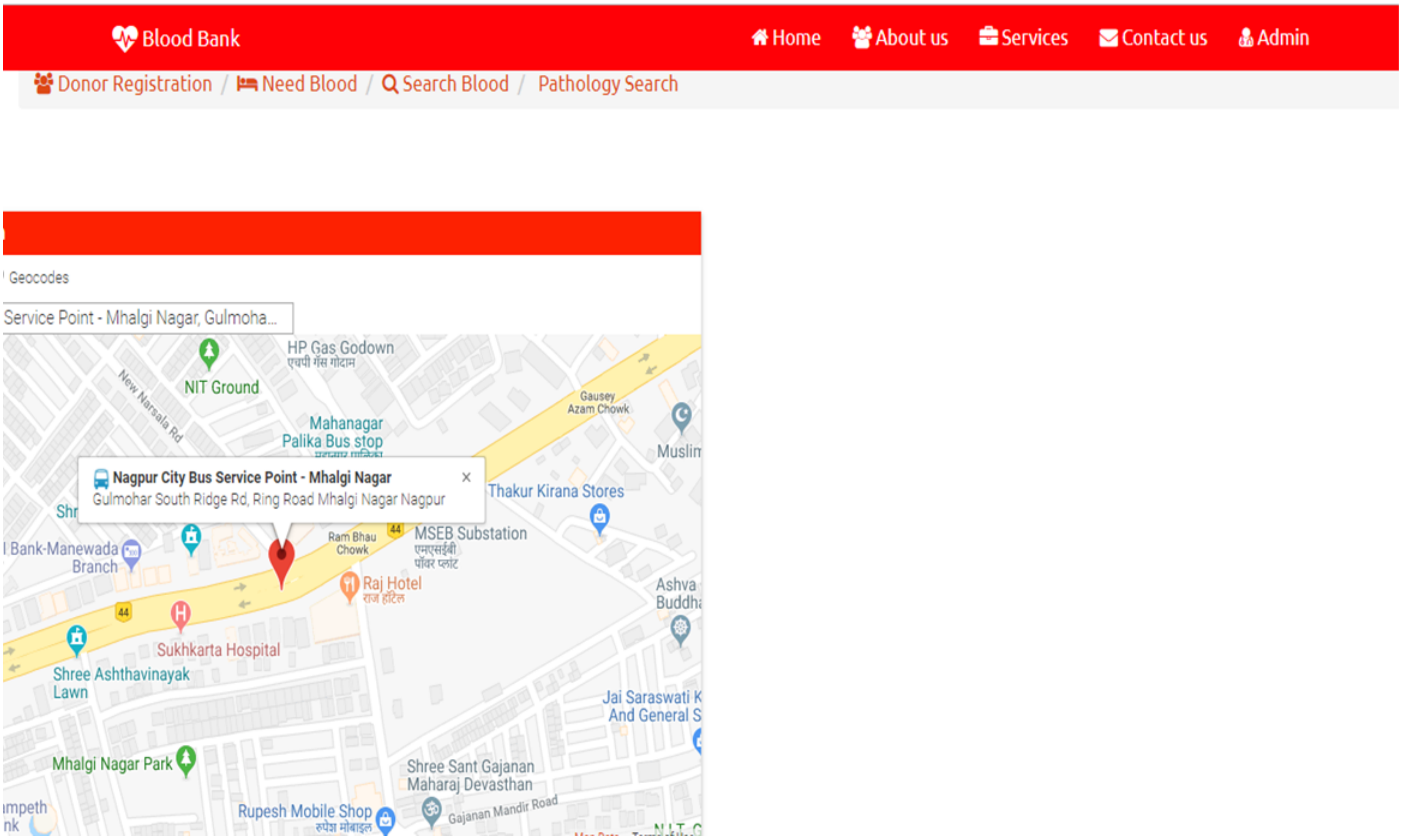
But you might ask, why not just simplify everything down to sines and cosines? The functions listed above were from a time without calculators, or efficient computer processors, when the user calculated angles and direction by hand using log tables, every named function took appreciable effort to evaluate. The point of these functions is if a table simply combines two common operations into one function, it probably made navigational calculations on a rocking ship more efficient. These function names have a simple naming pattern and in this example, the "Ha" in "Haversine" stands for "half versed sine" where haversine (θ) = haversine (θ)/2. (When using these formulae, one must ensure that h does not exceed 1 due to a floating point error (d is only real for h from 0 to 1). h only approaches 1 for antipodal points (on opposite sides of the sphere)—in this region, relatively large numerical errors tend to arise in the formula when finite precision is used. Because d is then large (approaching πR, half the circumference) a small error is often not a major concern in this unusual case (although there are other great-circle distance formulas that avoid this problem). (The formula above is sometimes written in terms of written in terms of the arctangent function, but this suffers from similar numerical problems near h = 1.) As described below, a similar formula can be written using cosines (sometimes called the spherical law of cosines, not to be confused with the law of cosines for plane geometry) instead of haversine, but if the two points are close together (e.g. a kilometer apart, on the Earth) you might end up with cos (d/R) = 0.99999999, leading to an inaccurate answer. Since the haversine formula uses sines, it avoids that problem. Either formula is only an approximation when applied to the Earth, which is not a perfect sphere: the "Earth radius" R varies from 6356.752 km at the poles to 6378.137 km at the equator. More importantly, the radius of curvature of a north-south line on the earth's surface is 1% greater at the poles (≈6399.594 km) than at the equator (≈6335.439 km)—so the equator (≈6335.439km)—so the haversine formula and law of cosines cannot be guaranteed correct to better than 0.5%.

S.No.	Name	Gender	Blood	City	State	Contact-1	Contact-2	View	Delete
1	Akanksha Puppalwar	Female	B+	Nagpur	Maharashtra	7776062156	865454164	View	Delete
2	Ashwini Ramteke	Female	A+	Nagpur	Maharashtra	8378090389	9422168479	View	Delete
3	neha pazare	Female	AB+	Nagpur	Maharashtra	9587412385	8456247912	View	Delete
4	sima gahane	Female	O+	Nagpur	Maharashtra	5348752694	2547896314	View	Delete
5	Shikha yadav	Female	O+	Nagpur	Maharashtra	9646497965	8941634194	View	Delete
6	Prashant kale	Male	B-	Pune	Maharashtra	8565959796	9624848497	View	Delete
7	Anandi joshi	Female	AB+	Pune	Maharashtra	96546546	855464949	View	Delete
8	swapnil joshi	Male	A-	Mumbai	Maharashtra	98656464	97246494	View	Delete
9	Bhavna ramdham	Female	A-	Mumbai	Maharashtra	869497946	905494679	View	Delete
10	Neha Nagure	Female	O-	Nagpur	Maharashtra	9032497797	902306474	View	Delete
11	Gunjan samrit	Male	B+	Nagpur	Maharashtra	961541696	895659646	View	Delete
12	Manthan khobragade	Male	O+	Nashik	Maharashtra	98544648	875555888	View	Delete
13	Mrunali Meshram	Female	B+	Nagpur	Maharashtra	96355494	96743656	View	Delete
14	devyani deshpande	Female	AB-	Aurangabad	Maharashtra	87549492	779494169	View	Delete

(a)



(b)



(c)

Fig .2: Screenshots of Blood Bank application

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CONCLUSION

This project would help in communicating with blood donors in a better manner .As it is also maintaining the databases of the registered Donor's from various blood donation camps, hospitals and pathologies. This may reduce cost of advertisements and also saves time during Medical emergency.

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