

Smart Blood Bank as a Service on Cloud

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Abstract: We all know the working of blood bank management system. A blood bank is a cache or bank of blood or blood components, gathered as a result of blood donation or collection, stored and preserved for later use in blood transfusion.[1]

In this project our aim is to develop a web application, which will be hosted on cloud and will provide fast and easy access to reports. We are using a concept of cloud computing. As we all know what the simple definition of cloud is computing in a very simple word, we say cloud computing is an on demand services.

The Concept of Cloud computing enables the feature of multi-tenant for our web application. This project provides a website to the blood banks and their data are stored inside the cloud database which is provided for individual organization. The next process where a webpage is provided to the user with the data embedded at the backend of the website through which they can refer availability of blood during emergency cases.

Keywords: cloud computing, information about the basic blood bank services, online blood bank services, concept of DBMS.

I. INTRODUCTION

This project is basically focused on improving conventional working of blood bank management information system using the concept of cloud computing. The term "blood bank" typically refers to a division of a hospital where the storage of blood product occurs and where proper testing is performed

Blood is the necessity of everyone and in every area specially in a rural area because of the lack of facilities of conventional blood bank management system available in the rural area. This introduction part includes the introduction about the conventional blood bank management system, blood bank services and some information about the cloud computing, and its services.[1]

Terminology used in blood bank management system as follows: -

- **Donors:** Person who wants to donate the blood.[1]
- **Seekers:** Person who wants the blood from the blood bank due to various reasons like accidents, surgeries, delivery and many more.[1]
- **Blood bank:** A blood bank is a cache or bank of blood or blood components, gathered as a result of blood donation or collection, stored and preserved for later use in blood transfusion.[1]

Blood bank management system provides the unique identification number at the time of blood donation camp, which helps him for the future correspondence. Blood bank management system has a permission to edit their information regularly. One of the major tasks performs by blood bank management system administrator to collect the information of all the donors' area wise and blood group wise.[9]

This system provides help to generate a report like donors, seekers information, total consumption of the blood units and overall report monthly, bi-monthly, quarterly, half yearly, and annually.[9]

Currently there are three primary categories of cloud computing services: -

- **Infrastructure as a service (IAAS):** - Computing infrastructure such as servers, storage, and network, delivered as a cloud service, typically through virtualization.[3]
- **Platform as a service (PAAS):** - Platform that can be used to develop and deploy applications.[3]
- **Software as a service (SAAS):** - Software deployed as a hosted service and accessed over the Internet.[3]

Cloud computing is a hot topic all over the world nowadays, through which customers can access information and computer power via a web browser. Hence, it eliminates the need for maintaining expensive computing facilities. The characteristics of a typical cloud are: on-demand access, Scalability, Elasticity, Cost Reduction, Minimum Management Effort, and Device/location independence. [1]

II. LITERATURE SURVEY

- During a literature survey we collected some of information about the blood bank management system located in city and rural area. We found some of the hospitals have its own blood bank unit and all technical facilities in cities but this conduction is poor in rural area.[7]
- Some of the countries maintain an online blood bank system like in [7]Sri Lanka. With reference article [1] India total blood collection in 7.5 million units yearly, 2% of blood is discarded (minimum) due to various reasons. If we deduct 2% of discarded blood, the total usable whole blood or red cells will be 6460,000 units in India. [1]For blood components, let us take a conservative estimate that only 25% blood is separated into components. In that situation, we will have about 1,365,000 components for patients. Now to find out the total revenue generation across the country, let us take the service charge ceiling lay down by the national aids control organization (NACO). NACO has prescribed rs.850 per unit of whole blood or RBC and 6460,000 units will generate Rs.549, 1000,000.on the other hand components will attract revenue of Rs.68, 2500,000 (@ rs.500 per component on an average).[1]
- Total revenue generated by whole blood/ red cells and components is Rs.6,17,35,00,000 (or us\$123270000 @1 USD = rs.50). We have four types of blood banks/Centres (from the administrative point of view) in India. [1]
- They are managed by the public (government) sector, Indian Red Cross Society (IRCS), nongovernment organizations (NGO's, on not for profit basis) and corporate or commercial sectors. Let us discuss today how efficiently more than 2,460 blood banks in India are managed. [1]
- Roughly, about 55% blood banks are from the government sector, 5% from the IRCS, about 20-25% are from the NGO sector and the rest are from corporate or profit-making sectors.[1]
- Every year our nation requires about 4Cores units of blood [1], out of which only 5Lakh units of blood are available.[1]
- India has many blood banks, all-functioning in a decentralized fashion. In the current system, individual hospitals have their own blood banks and there is no interaction between blood banks.[1]
- All the blood banks are attached to hospitals and there is no stand-alone blood bank. [1]

III. PROBLEM DEFINITION

Problem definition of our underlying system which provides the services in the form of software to the Blood banks through cloud and is covered by the following points:-

- The main process of this system is to provide the user the details about the availability of the blood.
- The second main objective is to achieve a multi-tenant environment to the blood bank through Internet.
- The project mainly deals with the multi-tenant environment by providing the both the software and database through cloud.
- Provide user with plenty of data about the blood which are available in nearer blood bank.
- Designing the multi-tenant website and database for blood bank.
- The basic problem is to define the software in the form of a website.
- Collection and processing - Units of WB and RBC are both kept refrigerated at 33.8 to 42.8 °F (1.0 to 6.0 °C), with maximum permitted storage periods (shelf lives) of 35 and 42 days respectively. RBC units can also be frozen when buffered with glycerol, but this is an expensive and time-consuming process, and is rarely done. Frozen red cells are given an expiration date of up to ten years and are stored at -85 °F (-65 °C). [1]
- Storage and management [8]- Routine blood storage is 42 days or 6 weeks for stored packed red blood cells, by far the most commonly transfused blood product, and involves refrigeration but usually not freezing
- Linking of individual database of all blood bank to the search page.

IV. PROPOSED SYSTEM

In this project we want to revisit autonomic computing, which defines a set of architectural characteristics to manage system, where complexity is increasing but must be managed without increasing cost or the size of the management team, where a system must be quickly adaptable to new technologies integrated to it, and where a system must be extensible from with incorporation out to the broader ecosystem and vice versa.

Our underlying principle is to migrate traditional static websites on cloud by providing user the application in the form of **Software As A service** (SAAS). The software that is proposed overcomes the disadvantages of the traditional software. These proposed software is going to work in the form of 2-tier architecture.

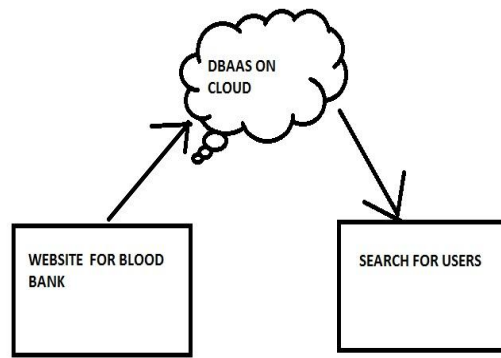


Fig 1: -Architecture Of Smart Blood Bank Services Using Cloud

The proposed software consists of both user and admin login where we are going to provide a website framework for the blood bank management. The blood banks registers to the main webpage provided through the cloud. By registration process the website automatically clones itself by providing a new account and also the new storage space to a particular blood bank. Now blood bank owns their own account and data space to work on an independent environment, the data entered by the blood bank gets stored in the database, which resides in cloud.

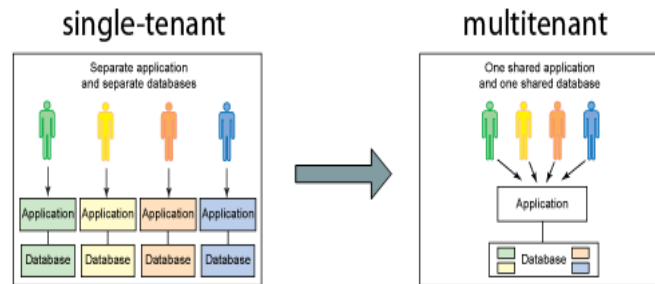


Fig 2:-Image Description Of Single-Tenant And Multi-Tenant Environment.[3]

Now there are different database from different blood banks, by using this data we are going to create a website for the customer providing the data from the database as a backend application. Each customer can access the website by unique login and password, due to this every customer are acknowledged about the availability of blood during emergency cases.

Using this technology, availability of blood is increased; this proposed project is more efficient, elastic in nature, multi-tenant, secure and user friendly in nature. The proposed system satisfies users requirements and also overcomes the disadvantages of traditional software system.

V. METHODOLOGY USED

The RAD (Rapid Application Development) model is based on prototyping and iterative development with no specific planning involved. The process of writing the software itself involves the planning required for developing the product.[11]

Rapid Application development focuses on gathering customer requirements through workshops or focus groups, early testing of the prototypes by the customer using iterative concept, reuse of the existing prototypes (components), continuous integration and rapid delivery. [11]

RAD model can be applied successfully to the projects in which clear modularization is possible. If the project cannot be broken into modules, RAD may fail. Following are the typical scenarios where RAD can be used:

- RAD should be used only when a system can be modularized to be delivered in incremental manner [11].
- It should be used if there's high availability of designers for modeling.[11]
- It should be used only if the budget permits use of automated code generating tools.[11]
- RAD SDLC model should be chosen only if domain experts are available with relevant business knowledge.[11]
- Should be used where the requirements change during the course of the project and working prototypes are to be presented to customer in small iterations of 2-3 months.[11]

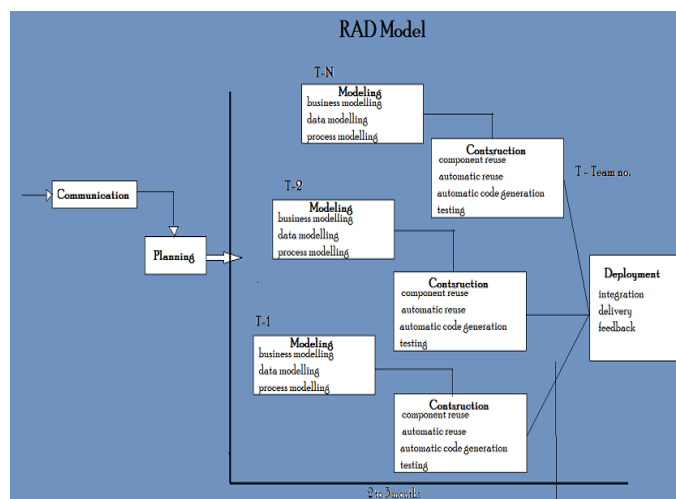


Fig 3: - RAD Model

VII. ALGORITHM

8.1: Algorithm for Blood Bank

1. Blood Bank Users should register to our website to gain access over the web-based software.
2. During registration they should enter their full details and 'successful registration' acknowledgement is done through Email authentication process.
3. Login process consist of captcha as a security process.
4. After login the authorized blood bank can access the full features of our multi-tenant website.
5. They can perform certain tasks like adding the details of donors, updating and deleting their details, managing stocks of blood.

8.2: Algorithm for Donor

1. The first procedure the donor should register with the website to gain access over the data provided through blood bank.
2. After registration the message for 'successful registration' is sent through email authentication.
3. After login the authorized user can search their requested blood group and also can view the profile of other user.
4. They can equally participate for Blood Donation Camp through the displayed notice board in their webpage which will redirect them to the respected blood bank website.

VI. CONCLUSIONS

This project shows the new working concept of blood bank management system. Information and computer technology is very famous in blood banks for its potentials in working efficiency as well as service quality we just provide a new facilities for all blood bank management as well as for seeker. It plays a vital role in this new concept. Apart from that seeker is also able to call the donor for blood in a very serious condition of patient.

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