This paper discusses the problems associated with the development of information management systems clinics. Presentation model of the system, which is based on a platform of technology cloud computing IBM SmartCloud and mobile phones. Giving the composition and structure of the clinics information management system that successfully support for user in managing patient information, medical history of the patients, the images for the diagnosis, prescriptions.

Keywords: Management information systems, clinics, cloud computing, mobile phone, healthcare.

Introduction

Lotus Domino is a solution of an open, unified architecture. Many large companies around the world trust and use IBM Lotus Domino to create information systems with high security applications and collaborative commerce.

The Domino server is installed with a standard Internet system, simple management system and integrated with the system. With long-term development, Lotus Notes / Domino overcomes the barriers of sharing resources, controlling systems, information distribution process and helps users with auto synchronization process. It helped customers improve their performance in the company.

Lotus Notes / Domino is a combination between a database and a text-based infrastructure for advanced e-mail. Application development on this platform can run on many operating systems.

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Model of cloud computing applications

Public cloud: owned and operated by the company. It is used to provide quick access to computer resources at reasonable prices for organizations or individuals. With the public cloud services, users do not need to purchase hardware, software and infrastructure support, because the service is owned and operated by the provider.

Private cloud: is owned and operated by the company that manages virtualized resources and services which are configured automatically and used by various ways of business and groups. Private cloud provides greater control over resources and be under clear directions from subscriber.
Hybrid clouds: combined with private cloud and public cloud services. Most companies with private clouds will grow to manage workloads between data centers, private and public clouds, thus creates a hybrid cloud.

The cloud-based applications – or Software as a Service (SaaS) which runs on the remote computer "in the cloud" is owned and operated by others and connected with the user's computer through the Internet, typically by a web browser. For example, Google's Gmail SaaS cloud-based is an alternative to traditional email programs, running on the computer, such as Outlook or Eudora.

Platform as a Service (PaaS): Provides an environment with everything needed to support the completion of the construction process and provide web-based applications (cloud) without the cost and complexity of buying and managing hardware, software, and provide cloud-based storage.

With PaaS, users can:
• Develop applications and attract the community.
• Deploying web applications to the cloud in minutes.
• Reduce complexity with intermediary service.

Infrastructure as a Service (IaaS): Provides companies with computer resources including servers, networking, storage, and data center space in a base pay-per-use.

The advantages of "leasing" the "virtual resource" under traditional bases include: 1) According to the service request and respond quickly in high or low rates. 2) Self-service, automated and self-sufficiency. 3) Reduce costs for economies of scale and integrated resources. 4) Pay to use, the cost is based on using the meter service.

These compelling benefits are important factors that make cloud technology a revolutionary breakthrough. Enterprises can reduce capital costs while achieving rapidity, the ability to apply new features quickly and to use information technology for business innovation (fig. 1).

The IBM Infrastructure is considered an open service; "IBM SmartCloud Enterprise" can provide virtual machines with highly security and flexibility upon requests from enterprises-level customers.

IBM SmartCloud Enterprise – IBM’s enterprise-class public cloud infrastructure-as-a-service (IaaS) – delivers secure and scalable hosted IT infrastructure with on-demand access to virtual server and storage resources. Well suited for development and test activities, as well as other dynamic workloads, SmartCloud Enterprise goes beyond competitive IaaS offerings with highly flexible services and IBM’s proven best-in-class security. Powered by six state-of-the-art green IBM data centers, SmartCloud Enterprise availability includes industry-leading IBM service-level agreements of 99.9%. 

Fig. 1. Cloud computing services
IBM SmartCloud Enterprise is part of IBM’s larger SmartCloud framework, which also includes cloud architecture for private and hybrid cloud, as well as Software as a Service (SaaS) business solutions.

**Structure of system**

The system includes the following modules: 1) Module decentralized management; 2) Module reception; 3) Module lab test; 4) Module diagnostic imaging management; 5) Module information and news; 6) Module pharmacy medicines; 7) Module reports.

The system serves the following objects:
- Secretary: As the manager of patient information, news.
- Doctor: As the manager of patient information, appointment list.
- Admin: Has full use of the functionality of the system.
- Customers (patients) can view the information about the clinic, doctor, make an appointment, see his/her medical information, etc. But to be able to view their medical history, customer needs to register an account in Module reception.

**Main functions of system**

First, you need to log in Reception Module. Username is authorized by Domino Admin. Then the user can log in via mobile phone, laptop or PC (fig. 2).

![Fig. 2. List of patient registration in the "mobile" mode](image)

After logging in, the screen will appear the interface of systems management clinic program (fig. 3).
The screen frame has 4 main functions: 1) Login information frame; 2) Functionality of the application frame; 3) Menu frame; 4) Information frame.

Especially for the navigation pane (Menu frame), the program will permit users to see only their work management menu. For example, when the user logged in as Doctor, they will only see the menu of their work management. Each doctor will have more information on the number of orders of their patients in the login box, which helps doctors check information of their patient easily.

Patient Management page with functions: edit patient information, delete patient, import and save medical information of patients for doctors, as well as review the visit history.

The "Enter medical information" button can help doctors monitor a patient’s status closely in order for proper treatment and prescriptions can be printed out if required. Doctor may ask patient to take more medical images if needed for future medical care. After completing medical information, the doctor clicks "Save", the information will be stored in the history list of the patient medical examination.

To help Board of Management clinic easily check the number of patients placed in the nearest 3-month, a management tab has accounting and statistical function which can calculate the number of patients of the clinic in general and of each doctor in specific; thus makes it easily to pay for the doctors. In addition, IBM Domino search function supports as an integrated feature.

The search process is very simple, just press the first letter, the system will automatically search for the relevant data. When you click on the name and select patient to read the information, after that the page will be switched to "Viewed".

When you click on specific information, the doctor can see the patient's medical information and specifically can choose "Quick Email" in order to give advice or prescriptions for patients. By clicking "Quick Email", the send mail interface will appear. Doctor just needs to include information to send. In particular doctors can view directly the response email from patients as well as internal messages from the clinic.

With simple software, patient management is done by the computer quickly. With the basic parameters such as: medical codes, names, sex, addresses, etc. Patient has a file management of all his/her illnesses, the history of other diseases of his family. But the most important are notes to the doctor about allergic conditions, complications of previous treatment, which help physicians not repeat the mistakes sometimes lethal previously.

It also includes the test results of the patients as well. Patients only need to take one sample without returning to the laboratory later. The results are handed directly to their physician.
Another benefit of the computerized clinic as liaisons with other colleagues, upon request, all clinical outcomes, information and patient data are sent via e-mail.

One undeniable benefit is the exchange of information, consultation and exchange of experience with the diagnosis and treatment of domestic and foreign colleagues and other health facilities.

**Conclusion**

On the basis of the IBM SmartCloud technology, clinics management system successfully built, initially allowing executive clinic management is optimal and convenient for patients and doctors. The system works well on mobile phones. Especially helps doctors easily control and manage information-appointment of their patients quickly and effectively.

**Bibliography**