

Web-based Multimedia GP Medical System

Chee Chern Lim, Man Hing Yu and Jesse J. Jin

School of Information Technologies, F09
University of Sydney, NSW 2006

{chern, zenoy, jesse}@it.usyd.edu.au

Abstract

This paper introduced GP-Soft, a powerful new patient management system, which is designed to improve the records management for clinic, nursing home and hospital. GP-Soft is a complete patient management system that includes a complete set of tools for handling prescription writings, medication, patient management and patient billing. In addition, GP-Soft also provides a set of integrated communication tools that will allow General Practitioners (GP) to carry out collaboration and discussion. It is the first web-based system to combine patient management, patient accounting and communication tools into an all-in-one solution desired by every GP in practice. The web-based system can provide easy access to the user using Internet/Intranet and operating system independent. The system supports a centralised control of patients' data on the server and provides information sharing and distributed data management through the network structure. GP-Soft can be installed on any platform system and is supported by a back-end database system.

Keywords: Patient management, Patient accounting WWW, CSCW, Portal.

1 Introduction

Since the Internet emerged as a global information network, data information is available to any Internet user from any place at any time. In the recent years, the rapid advancements in technology and telecommunications, especially the Internet, have led to an explosive growth of Web-based Internet Application. The World Wide Web (WWW) is emerging as the most popular medium for delivering business strategy and an increasing number of software vendors are integrating various features of the Web in novel ways to provide much advanced system for clients from different industry.

As in the healthcare industry, software developers have implemented numbers of solutions to deliver patient management in the following main areas – clinical, appointments and billing. In clinical section, the healthcare system provides very basic standard clinical related functionalities.

For instance, tools for handling prescription-writing, managing patient consultation record, requesting pathology tests and importing pathology results.

In Australia, three most widely used healthcare systems are: Medical Director (MD) [1]; Genie [2] and Monet [3]. They all meet the requirements in providing a satisfactory of patient management system. However, Medical Director is the program that most doctors have chosen in preference to the other candidates, this is mainly due to the ease-of-use featured in the system. Medical Director was actually written by an Australian GP with input from hundreds of GP colleagues [1]. PracSoft is another healthcare system that only handling the patient accounting and patient appointment [4]. Thus, PracSoft is designed to integrate with the Medical Director. PracSoft and Medical Director programs databases will be synchronised through the linking between the two systems. Genie is the second most widely used healthcare system in Australia. Genie is fully integrated, incorporating appointments, billing and clinical management, but none of the systems including the communication tools for collaboration between users.

The proposed system will be implemented mainly in PHP [5] and MySQL [6]. The chat module in the communication component will be written with Java. The aim is to integrate all essential clinical and collaboration functionalities into one consistent and convenient set of tools accessible via a web browser. Besides products such as Medical Director, Genie and Monet, there are still many other individual clinical program that compete with GP-Soft's full-featured set of tools, but as a whole, there are not many software applications that may be able to compete with GP-Soft's breadth in variety of functionality.

This paper will first provide the system structure overview of GP-Soft – a newly proposed healthcare management system. GP-Soft is a web-based patient, appointment, house call and billing management system. It integrates web technology with database system and provides user-friendly interface. This paper starts with a presentation of the Internet-based all-in-one healthcare system and continues by outlining the modules in the corporate system. Then it discusses a set of integrated communication tools designed to improve the collaborative works between the General Practitioners or other system users. Finally, this paper presents a broad outline of the evaluation by making comparisons with the other systems.

2 GP-Soft Solutions

2.1 All-In-One Web-based Centralised System

In this paper, we proposed an all-in-one web-based healthcare system that integrates components including patient management, patient accounting, appointment, house call and communication into one complete package solution. The system is designed by using the framework based on Web Content Component Model (WCCM), which is the suitable model of web application that can maintenance of content oriented web application [7]. In addition, the components will be developed using portal technology. A healthcare web portal serves as the integrated gateway in a healthcare centre website and provides users (General Practitioners, Nurses, Patients or Clerks) with a single point of access for the healthcare services delivery [8].

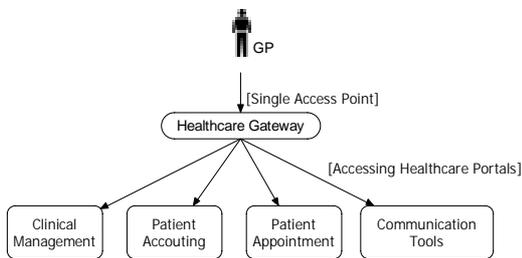


Figure 1. Healthcare portal system

Figure 1 shows that the system provides users with a single access point to the healthcare portals. Portal technology supports single point of access and also different accessing levels. This can prevent patients' records being accessed by un-authorized personnel while maintaining one simple gateway for all levels users.

Another issue is regarding the centralised control of the patients' records.

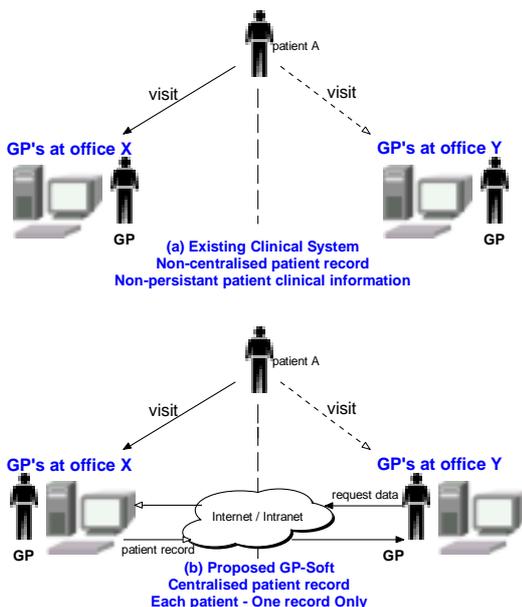


Figure 2. Patient records in existing system vs GP-Soft

In Figure 2(a), it shows that normal existing softwares do not support a centralised data information system. For example, a GP may practice at two different locations: X and Y. Patient A may visit GP at location X or Y depending on the day where the GP is working at. Normally, Medical Director and other systems only support Intranet access connection. In other words, the GP is required to install two separated systems at the two different locations, each system will contain the same patient's information but with different clinical information. This leads to a non-centralised patient records. However, in the proposed web-based system shown in Figure 2(b), GP can operate the system in the other offices and access the patients' records through the Internet. In this way, it provides a centralised environment and GP will only keep one clinical record for each patient. GP-Soft offers users an easy way to access patient records through Internet using standard web browser.

However, the accessibility of Internet connection is sometimes unpredictable. If the Internet connection is not available, the GP is not able to access patient record in a remote system. Thus, GP has no choice but to create a new patient record in local system. To ensure that both systems are keeping the up-to-date patients information, a control function will be used to synchronise each program database thus avoiding the need to manually update patient information into both system. In Figure 3, it shows each program system connects to each other and performs synchronisation on program database when the Internet connection is available.

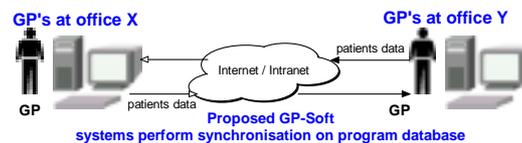


Figure 3. Synchronisation on program database

2.2 Multimedia Collaboration Communication

The web-based healthcare program is designed with an extra communication component on top of the core framework. This component is proposed for medical diagnosis, image analysis and test report between General Practitioners according to the concept of CSCW (Computer Supported Cooperative Work) [9]. Because GP-Soft is web-based, it is accessible from any browser and in any global location. Individually, the communication tools that GP-Soft is designed of have many competitors that are currently in use by the corporate community. The communication component includes the following features modules:

2.2.1 Chat

This component will be implemented purely in Java. The client applet will be written in pure applet and so the applet will be compatible with Java 1.1.5 and Microsoft's Java VM plug-in for Internet Explorer. The objective of this design is to ensure that the applet can be run from the most common web browser (i.e. Internet Explorer or Netscape Communicator). The online chat system is designed to be easily extendible and configurable no matter what sort of system it is deployed on, with minimal dependencies.

In the chat module, the system will also provide a 'File Transfer' function. This function allows active user in chat session to send file to other user in the same session. This greatly improves the collaboration between the system users. In the other existing systems, users can only exchange files through e-mail. Thus, any user without email address is basically impossible to communicate with other users. This shows that GP-Soft has provided much better communication tools than any other existing systems.

2.2.2 Simultaneous Group Web Browsing

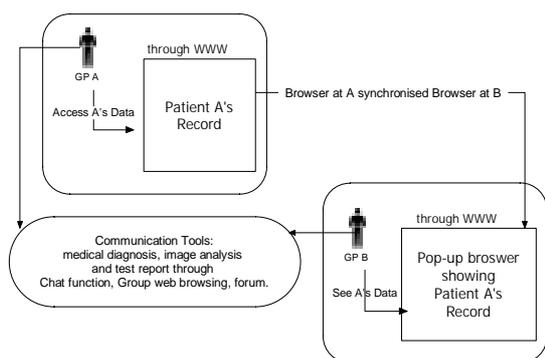


Figure 4. Group Web Browsing Collaboration

Synchronised group web browsing is the next feature communication tool in the proposed system. In Figure 4, GP 'A' logon to the system, GP 'B' joined GP A in chat session. GP 'A' can set a URL address in the chat applet. When a URL is set, GP 'A' and 'B' will have their browser windows display the set URL. General Practitioners can use this tool to discuss specified patient record, or else they can use group web browsing to browse clinical articles or any documents available in WWW. In addition, they can take personal note during the group web browsing. This feature can also be used as a training tool in hospital or any learning community. None of the clinical systems currently support this feature. However, several online education systems do offer this innovative function. One of the most popular online education systems is Blackboard. The communication tools in Blackboard are much like the proposed GP-Soft except it targets the education industry [10].

2.2.3 Electronic Whiteboard

The idea of whiteboard is to let users draw to each other. The whiteboard is designed to have the option of saving the drawing and opening standard image file type such as JPEG. With the ability to save and open image file, General Practitioner can open medical image and users can discuss and analysis on the whiteboard. Users can draw lines, rectangles, text, scribbling, and ovals, of any colour on the whiteboard and save it for later use. Again, this greatly improves the communication and collaborative group work between the General Practitioners. This component is similar to chat component. It will be implemented purely in Java, thus users can run it from the standard web browser on any platform.

2.3 Evaluation

This proposed system certainly has many advantages than the other clinical system. The system will be implemented using open source programs and tools such as MySQL, apache, PHP and Java. It can reduce the cost of the development and hence pass on the savings to the consumer, the user do not have to pay for any licensing costs. The system is platform independent. It is designed so it can be installed on Windows, Solaris UNIX or Linux platform. The system only needs to be installed on a server machine, and no other installation is required on users' terminals since it is a web-based system, thus users can simply access to the server system using any standard web browsers. The system provides real time data sharing among the users. Users can access the system over local area network or global Internet. In addition, the system will include a multimedia collaboration component for General Practitioners to participate in medical diagnosis and discussion.

3 Conclusion

This paper proposed a healthcare system that integrates patient management, patient accounting and users collaboration into an all-in-one web-based application. The framework is carefully designed according to the model of WCCM, and the entire system will be implemented using portal technology. In addition, the communication component is designed according to the concept of CSCW. The web-based multimedia healthcare system provides a centralised control in the database. GP-Soft is platform independent. It can be installed on any server and users can access the system through Internet/Intranet using standard web browser regardless of the client's operating system. GP-Soft will be the ideal system for any doctors working in clinics or hospitals.

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