Health Information System Using Open Source API

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ABSTRACT

Electronic Health Record helps expand patient safety and quality of care, but it has the exertion of Health Information Exchange at different hospitals. The Clinical Document Architecture (CDA) -core document standard to guarantee such interoperability.A problem arises even when more hospitals start using the CDA document format because the data distributed in different documents are hard to manage. In this paper, we describe our Health information exchange using Open API service based on cloud computing.CDA document generation and integration Open API service generate CDA documents without having to obtain proprietary software. It integrates several CDA documents per patient into a single CDA document. Developers using diverse platforms thus we can use our system to enhance interoperability.SOAP (Simple Object Access Protocol) is used as transmission protocol for the purpose of enhancing interoperability. If this service is provided for free at low price to hospitals, existing EHR are more likely to consider adoption of CDA in their practices.

KEYWORDS

Health information exchange, HL7, CDA, cloud computing, software as a service

1 INTRODUCTION

Health information is defined as information pertaining to the health care provided to an individual or health of an individual and it can support of efficient processes for health care delivery especially, clinical document standardization lies at the core of guaranteeing interoperability. Effective health information exchange needs to be standardized for interoperable health information exchange between hospitals. When a patient is diagnosed at a clinic, a CDA document recording the diagnosis is generated. The CDA document can be shared with other clinics if the patient agrees. The concept of family doctor does not exist in Korea, hence it is common for a patient to visit a number of different clinics. The exchange of CDA document is triggered in the following cases: medical history; when referral and reply letters are drafted for a patient cared by multiple clinics; when a patient is in emergency and the medical history needs to be reviewed. It takes increasing amount of time for the medical personnel as the amount of exchanged CDA document increases because more documents means that data are distributed in different documents.

This significantly delays the documents are integrated into a single document, the medical personnel is history conveniently in chronological order. In this paper we present a CDA document generation system that generates CDA documents on different developing platforms and, a CDA document integration system that integrates multiple CDA documents scattered in different hospitals for each patient. The benefits of adopting this system are as

follows. First, the system is accessible through an Open API and developers can continue working on their developer platforms they specialize in such as Java, .NET, or C/Cpp. Hospital systems can simply extend their existing system rather than completely replacing it with a new system. Second, it becomes unnecessary for hospitals to train their personnel to generate, integrate, and view standard-compliant CDA documents. Third, if this service is provided for free at low price to hospitals, existing EHR are more likely to consider adoption of CDA in their practices.

2 RELATED WORK

When a patient is diagnosed at a clinic, a CDA document recording the diagnosis is generated. The exchange of CDA document is triggered in the following cases (ex:when a physician needs to study a practical limitation for individual hospitals to develop and implement a CDA document integration technology.

If one patient received care from several hospitals at around the same time. When the patient visited a new hospital, the new hospital's physician tried to get patient information the previous hospital. Thus, patient information is frequently exchanged between them. Many types of healthcare facilities have implemented an electronic medical record system, but in Japan, healthcare information exchange is often done by paper. In other words, after a clinical doctor prints a referral document and sends it to another hospital's physician, another hospital's doctor receives it and scans to store the EMR in his own hospital's system. It is a wasteful way to exchange healthcare information about a patient.

2.1 GENERATING STANDARDIZED CLINICAL DOCUMENTS FOR MEDICAL INFORMATION EXCHANGE

Ean-Wen Huang et al. proposed to facilitate the exchange of medical information involved developing a system that automatically generates samples for the 108 different types agree upon a standard format and coding system for medical information documents. our efforts to create a comprehensive specification system to help hospital staffs create EMRs that conform to the HL7 CDA. The guidelines comprise online documents and formats, categorized according to the various paper forms used in different hospitals.

The drawback of this system is that it validate the constraints. In the future, existing system. This will help hospitals exchange information, reduce their use of medical resources, and enhance the quality of medical services that they provide.

2.2 SECURITY ENHANCEMENT OF HEALTH INFORMATION EXCHANGE BASED ON CLOUD COMPUTING SYSTEM

D. Padmini Bai et al. proposed to providing security to the CDA document and a unique identity (id) is generated and given to the patients for avoiding the interchanging and duplication of medical reports. Every detail in CDA Document is Encrypted and stored in Database. All Details in CDA Document is secured using various Security Algorithms. The drawback of this system is that security in upload a CDA Document and Download /View the CDA Document and also the challenge to improve security while ensuring sensible superiority of service even

with numerous users logged on the system at the similar time.

2.3 HL7 IMPLEMENTATION GUIDE FOR CDA Release 2: ERSONAL HEALTHCARE MONITORING REPORT

The HL7 Version 3 Clinical Document Architecture (CDA®) is a document markup standard that specifies the structure and semantics of "clinical documents" [1]for the purpose of exchange between healthcare providers and patients. Pratical limitation for individual hospitals to develop and implement a CDA document platform to expand the defines a clinical document as having the following six characteristics: 1) Persistence, 2) Stewardship, 3) Potential for authentication, 4) Context, 5) Wholeness and 6) Human readability. Supports the exchange of clinical documents between those involved in the care of a patient .Supports the re-use of clinical data for public health reporting, quality monitoring, patient safety and clinical trials. Can be reused in multiple applications.

2.4 SERVICE - BASED SYSTEMS IN CLINICALENVIRONMENT TECHNICAL REPORT

An architectural approach to add quality-of-service (QoS) assurance and location awareness to service-based systems within existing clinical infrastructures is discussed here.[9] To address typical design requirements of such systems (e.g., cooperating services, performance and availability) the work proposes a serviceoriented architecture (SOA) as architectural concept and architectural translucency to provide stable QoS. We evaluate position sensing systems, QoS assurance approaches and present design principles for service-based health care applications.

3 PROBLEM DEFINITION

The reason to define the algorithm for generating and integrating the health record using cloud. A solution that integrates multiple CDA documents into one does not exist. integration technology. It is not time efficient and It is hard for medical personnel to manually collect all the past generated CDA documents.

4 PROPOSED WORK

A CDA document generation system that generates CDA documents on different developing platforms A CDA document integration system that integrates multiple CDA documents scattered in different hospitals for each patient.

A solution that integrates multiple CDA documents into one does not exist yet to the best of our knowledge. There is a practical limitation for individual hospitals to develop and implement a CDA document integration technology. The following systems are proposed: 1)A CDA document generation system that generates CDA documents on different developing platforms. 2) CDA document integration system that integrates multiple CDA documents scattered in different hospitals for each doctors and patient

4.1 CDA generation System

CDA documents can be generated on the health information systems of different hospitals by using our cloud computing-based CDA generation system. In this, Hospitals do not have to purchase propriety software to generate and integrate CDA documents. Hospitals do not bear the cost as

before. Our service is readily applicable to various developer platforms because an Open API is to drive our CDA document generation and integration system. CDA document generation and integration system based on cloud server

CDA Generation API data are Set and passed on to CDA Generator. CDA Generator gets a CCD template from Template is more useful over existing services for CDA document if the variety of CDA document increases. CDA Generation API generates CDA documents on cloud. CDA Generation Interface uses the API provided by the cloud and relays the input data and receives CDA documents generated in the cloud.

Template Manager is responsible for managing the CDA documents generated in the cloud server. Our system uses CCD document templates.

CDA Generator collects patient data from hospitals and generates CDA documents in the template formats as suggested by the Template Manager.

CDA Validator inspects whether the generated CDA document complies with the CDA schema standard.

In hospital, the information of patient, hospital, and physician is entered via CDA Generation Interface and it is stored in the cloud server via CDA Generation API. SOAP (Simple Object Access Protocol) is used here as transmission protocol for enhancing interoperability among different HIS when a hospital sends data to the cloud. CDA Generation API imparts the data in the CDA Header/Body in the list type. CDA Header include PatientID, BirthDate, Gender, GivenName, and Family-Name. CDA Body

contains Problem, Medication, Laboratory, Immunization. Bundled in CDA Header Set and CDA Body Manager and fills in the appropriate fields of the CCD template with the data from the CDA

Header/Body Sets. CDA Validator checks the generated CDA document whether the CDA standards are being satisfied. It is verified that, there is any missing element or the format is adequately followed. CDA document is returned to the recipient hospital if the validation is correct. Hospitals A and B are presented to demonstrate that it is possible for different development platforms to extend to generate CDA documents via a cloud server.
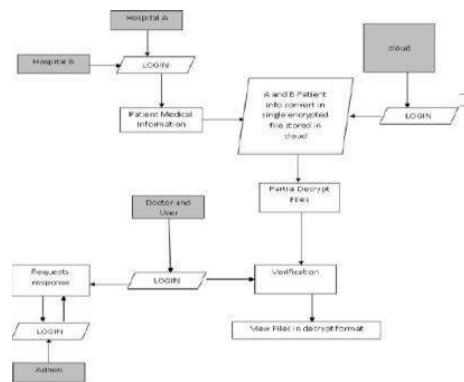

Fig: Flow diagram of CDA Generation and Integration

4.2 CDA Integration system

CDA Integration system is used to combine the all the CDA file available for the particular patient. It will incorporate N number of CDA files of particular patient from the multiple hospitals. Generate an secured access for Patient and Doctor to view the integrated CDA file and also generate an individual login for the patient and the doctor. So they can view the authorized CDA files. Doctor has the authority to view the integrated CDA file of the patient to give an exact treatment and also patient has the

authority to view their own integrated CDA file.

Our cloud computing based CDA generation and integration system has a few pronounced advantages over other existing projects. Hospitals do not have to purchase propriety software to generate and integrate CDA documents and bear the cost as before.Our service is readily applicable to various developer platforms because an Open API is to drive our CDA document generation and integration system. Regardless of the type of the platform, CDA documents can be easily generated to support interoperability.CDA document generation and integration system based on cloud server is more useful over existing services for CDA document if the variety of CDA document increases.

4.3 Construction using Cloud Computing

We can choose any tool as the cloud platform for our CDA generation and integration system. Microsoft Windows Server was selected as its operating system.

4.4 Generation of CDA Documents on Different Developer Platforms through Cloud

To confirm whether the system execute as planned, we requested CDA document generation on different systems implemented on diverse developer platforms via our API. The data does not relate to any definite person. It is fictional,and accessible for public contact.

5 DISCUSSION AND CONCLUSION

Our cloud computing based CDA generation and integration system has a few pronounced advantages over other existing projects. First, hospitals do not have to purchase propriety software to generate and

integrate CDA documents and bear the cost as before. Second, our service is readily applicable to various developer platforms because an Open API is to drive our CDA document generation and integration system. Regardless of the type of the platform, CDA documents can be easily generated to support interoperability. Third, CDA document generation and integration system based on cloud server is more useful over existing services for CDA document if the variety of CDA document increases.

In our future work, we will explore the following points. First, we will make a concrete estimation of the reduction in cost when the EHR system becomes cloud-based. Establishing a reasonable fee system is an important issue for cloud computing. There is ample evidence that cloud computing is effective and efficient in cost reduction, and the medical field seems to be no exception. Security and stability is top priority for cloud computing resources as it is used by many users. Future work will attempt to enhance security while ensuring reasonable quality of service even with multiple users logged on the system at the same time

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