

A New Enhance Secure System For Quality Services In Health Information System On Cloud.

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ABSTRACT

Maintenance of Electronic Health Record helps improve patient safety and quality of care, but to do that we need the operation of interoperability between Health Information Exchange at different hospitals. The Clinical Document Architecture (CDA) established by HL7 is a core document standard to ensure such interoperability. Unfortunately, hospitals refuses to adopt interoperable HIS due to its deployment cost. More problems arise when all hospitals start using the CDA document format because the data scattered in many documents are difficult to manage. In this paper, we describe our CDA document generation and integration which is an Open API service based on cloud computing, through which hospitals are enabled to conveniently generate CDA documents without having to purchase software. Our CDA document integration system integrates multiple CDA documents per patient into a single CDA and physicians and patients can browse the clinical data in chronological order. Our system of CDA document generation and integration is based on cloud computing and the service is offered through Open API. Developers using different platforms thus can use our system to enhance interoperability.

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

1. INTRODUCTION

Electronic Health Records is a great tool for physicians and is about quality, safety and efficiency for health care delivery. In order to ensure successful an operation of EHR, a Health Information Exchange (HIE) system need to be implemented [1]. Health Level Seven (HL7) has established CDA as a major standard for clinical documents [2]. CDA is a document markup standard that defines the structure and semantics of clinical document for the purpose of exchange. The first version of CDA was developed in 2001 and Release 2 came out in 2005 [3]. The Generation of CDA document, in each hospital invariably requires a separate Clinical Document Architecture system. So the hospitals are reluctant to adopt the new system. Solution of this problem is adoption of EHR (Electronic Health Record). The amount of exchanged CDA Document increases the time because of more documents that data are distributed in different documents. So all the CDA documents are integrated into a single document, the physician is empowered to review the patient's clinical history with conveniently. Although the

Clinical Document Architecture is in XML based format, the physicians can be delay for making decisions. So adopting

the system of new CDA architecture can give a elegant and contented file to users.

2. RELATED WORK:

1) Interoperability of personal health records

AUTHORS: J. L ahteenm€ aki, J. Lepp anen, and H. Kaijanranta,

The establishment of the Meaningful Use criteria has created a critical need for robust interoperability of health records. A universal definition of a personal health record (PHR) has not been agreed upon. Standardized code sets have been built for specific entities, but integration between them has not been supported. The purpose of this research study was to explore the hindrance and promotion of interoperability standards in relationship to PHRs to describe interoperability progress in this area. The study was conducted following the basic principles of a systematic review, with 61 articles used in the study. Lagging interoperability has stemmed from slow adoption by patients, creation of disparate systems due to rapid development to meet requirements for the Meaningful Use stages, and rapid early development of PHRs prior to the mandate for integration among multiple systems. Findings of this study suggest that deadlines for implementation to capture Meaningful Use incentive payments are supporting the creation of PHR data silos, thereby hindering the goal of high-level interoperability.

2) Applying cloud computing model in PHR architecture.

AUTHORS: S. Kikuchi, S. Sachdeva, and S. Bhalla,

In recent years, some practical and commercial Personal Health Records and some related services such as Google Health [1] and Microsoft HealthVault [2] have been launched. On the other hand, Cloud Computing has matured more and become the major streams to realize a more effective operational environment. However so far, there have been few studies in regards to applying Cloud architecture in the PHR explicitly despite generating volume data. In this paper, we review our trial on the general architecture design by applying the Cloud components for

supporting healthcare record areas and clarify the required conditions to realize it.

3. Health Information Privacy, Security, and Your EHR.

AUTHORS: M. Bellare

If your patients lack trust in Electronic Health Records (EHRs) and Health Information Exchanges (HIEs), feeling that the confidentiality and accuracy of their electronic health information is at risk, they may not

3. EXISTING SYSTEM

- ❖ Effective health information exchange needs to be standardized for interoperable health information exchange between hospitals. Especially, clinical document standardization lies at the core of guaranteeing interoperability.
- ❖ 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 medical personnel in making decisions. Hence, when all of the CDA documents are integrated into a single document, the medical personnel is empowered to review the patient's clinical history conveniently in chronological order per clinical section and the follow-up care service can be delivered more effectively. Unfortunately for now, a solution that integrates multiple CDA documents into one does not exist yet to the best of our knowledge and there is a practical limitation for individual hospitals to develop and implement a CDA document integration technology.

DISADVANTAGES OF EXISTING SYSTEM:

- ❖ The HIS development platforms for hospitals vary so greatly that generation of CDA documents in each hospital invariably requires a separate CDA generation system. Also, hospitals are very reluctant to adopt a new system unless it is absolutely necessary for provision of care. As a result, the adoption rate of EHR is very low except for in a few handful countries.
- ❖ Unfortunately for now, a solution that integrates multiple CDA documents into one does not exist yet to the best of our knowledge and there is a practical limitation for individual hospitals to develop and implement a CDA document integration technology.
- ❖ To establish confidence in HIE interoperability, more HIS's need to support CDA. However, the structure of CDA is very complex and the production of correct CDA document is hard to achieve without deep understanding of the CDA standard and sufficient experience with it.

4. PROPOSED SYSTEM:

want to disclose health information to you. Withholding their health information could have life-threatening consequences. To reap the promise of digital health information to achieve better health outcomes, smarter spending, and healthier people, providers and individuals alike must trust that an individual's health information is private and secure.

Your practice, not your EHR developer, is responsible for taking the steps needed to protect the confidentiality, integrity, and availability of health information in your EHR system.

- ❖ In this paper we present (1) a CDA document generation system that generates CDA documents on different developing platforms and (2) a CDA document integration system that integrates multiple CDA documents scattered in different hospitals for each patient.
- ❖ 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.

ADVANTAGES OF PROPOSED SYSTEM:

- ❖ 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.
- ❖ The cloud CDA generation service produces documents in the CDA format approved by the National Institute of Standards and Technology (NIST).
- ❖ 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.
- ❖ Interoperability between hospitals not only helps improve patient safety and quality of care but also reduce time and resources spent on data format conversion.

SYSTEM ARCHITECTURE:

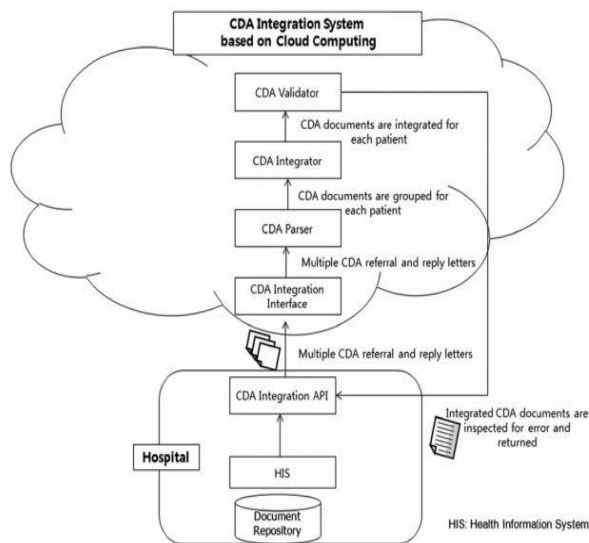


Fig. 1.1 Architecture of system

5. IMPLEMENTATION

Construction of System Environment

- ❖ In the first module we develop the Construction of the System Environment to prove our proposed system model. In this module we develop Hospital A, Hospital B, Doctor, Patient/User, Admin and Cloud Modules.
- ❖ In Hospital A, we create the User Authorization with Login Credentials. This module provides the option of Upload the Patient details as XML File in the Cloud with Encrypted and also provides the option to check the status of the uploaded file with the XML Format. The same is followed in the Hospital B too.
- ❖ In the Admin part, we provide the Admin Authorization with login Credentials and view pending request of users and doctors. The admin only give Approval to the request by sending secret key to user/doctor to access the file.
- ❖ In cloud Login, view the patient details in the XML format which is acquired from CDA.

The CDA Document

- ❖ In this module we develop the CDA document. The HL7 Clinical Document Architecture Release 2 (CDA R2) was approved by American Nation Standards Institute. It is an XML-based document markup standard that specifies the structure and semantics of clinical documents, and its primary purpose is facilitating clinical document exchanges between heterogeneous software systems.
- ❖ A CDA document is divided into its header and body. The header has a clearly defined structure and it includes information about the patient, hospital, physician, etc. The body is more flexible than the header and contains

various clinical data.

- ❖ Each piece of clinical data is allocated a section and given a code as defined in the Logical Observation Identifiers Names and Codes (LOINC). Different subcategories are inserted in a CDA document depending on the purpose of the document, and we chose the Continuity of Care Document (CCD) because it contains the health summary data for the patient and it is also widely used for interoperability.

Construction of a Cloud Computing Environment

- ❖ In this module we develop the Cloud computing environment. We use DriveHQ Cloud Service provider to upload our files in the Cloud.
- ❖ In this module, we develop the construction of a Cloud Computing Environment and how multiple CDA documents are integrated into one in our CDA Document Integration System. The standard for this is Korean Standard for CDA Referral and Reply Letters (Preliminary Version). Templates which generate a CDA use CCD part of Consolidated CDA which is released by ONC and made by HL7. However, an actually generated CDA has a form of CDA Referral and Reply Letters.
- ❖ The rationale for CDA document integration is as followed. When CDA-based HIE (Health Information Exchange) is actively used among hospitals, the number of CDA documents pertaining to each patient increases in time. Physicians need to spend a significant portion of their time on reading these documents for making clinical decisions.
- ❖ At a hospital, the CDA documents to be integrated are processed through our CDA Integration API. The CDA Integration Interface relays each CDA document sent to the cloud to the CDA Parser, which converts each input CDA document to an XML object and analyzes the CDA header and groups them by each patient ID. The CDA Document Integrator integrates the provided multiple CDA documents into a single CDA document. In this process, the data in the same section in the document body are merged.

Integration of CDA Documents via Our Cloud Server

- ❖ We integrated multiple CDA documents of patient referrals and replies by using the API at our server. The use case scenario and patient data used for integration are shown in this module.
- ❖ We adopted sample patient data provided by the US EHR Certification Program, Meaningful Use. The data does not pertain to an actual person. It is fictional, and available for public access. This module is to show how a client integrating multiple CDA documents by using our API. The sample many clinical documents are shown to be successfully integrated.

6. CONCLUSION

Interoperability not only helps to improve patient safety and quality of care but also reduce time and resources spent on data format conversion between hospitals. The CDA document format a clinical information standard hospitals, a large number of HIE projects that use the Clinical Document Architecture format have been undertaken in many countries [14]. So the health information records are Generated and Integrated as a clinical document XML based file format in chronological order on cloud. The hospitals are not ready to buy licensed software to generate and integrate CDA documents. Since the upgradation of the software and supporting software's are to be purchased in regular intervals. The service can applicable to various developer platforms because the CDA document generation and integration system is drive by open API. With cloud server the document can provide easy access with CDA. Increases of HIE based on the CDA documents, achieves its interoperability. But physicians get inconvenient to refer multiple documents. So multiple CDA documents are integrates into one through CDA Integration system. Final result of CDA Document is based on XML format. In the proposed system, the CDA XML based document converted to readable format using the API.

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REFERENCES

- [1] Y. Kwak, "International standards for building electronic health record (ehr)," in Proc. Enterprise Netw. Comput. Healthcare Ind., pp. 18–23, Jun. 2005.
- [2] M. Eichelberg, T. Aden, J. Riesmeier, A. Dogac, and Laleci, "A survey and analysis of electronic healthcare record standards," ACM Comput. Surv., vol. 37, no. 4, pp. 277–315, 2005.
- [3] T. Benson, Principles of Health Interoperability HL7 and SNOMED. New York, NY, USA: Spinger, 2009.
- [4] J. Lehtinen, J. Leppänen, and H. Kaijanranta, "Interoperability of personal health records," in Proc. IEEE 31st Annu. Int. Conf. Eng. Med. Biol. Soc., pp. 1726–1729, 2009.
- [5] R. H. Dolin, L. Alschuler, C. Beebe, P. V. Biron, S. L. Boyer, D. Essin, E. Kimber, T. Lincoln, and J. E. Mattison, "The HL7 Clinical Document Architecture," J. Am. Med. Inform. Assoc., vol. 8, pp. 552–569, 2001.
- [6] R. H. Dolin, L. Alschuler, S. Boyer, C. Beebe, F. M. Behlen, P. V. Biron, and A. Shabo, "The HL7 Clinical Document Architecture," J. Am. Med. Inform. Assoc., vol. 13, no. 1, pp. 30–39, 2006.
- [7] M. L. Muller, F. Eickert, and T. Burkle, "Cross-institutional data exchange using the clinical document architecture (CDA)," Int. J. Med. Inform., vol. 74, pp. 245–256, 2005.
- [8] H. Yong, G. Jinqiu, and Y. Ohta, "A prototype model using clinical document architecture (cda) with a japanese local standard: designing and implementing a referral letter system," Acta Med Okayama, vol. 62, pp. 15–20, 2008.
- [9] K. Huang, S. Hsieh, Y. Chang, F. Lai, S. Hsieh, and H. Lee, "Application of portable cda for secure clinical-document exchange," J. Med. Syst., vol. 34, no. 4, pp. 531–539, 2010.
- [10] C. Martinez-Costa, M. Menarguez-Tortosa, and J. Tomàs Fernández-Breis, "An approach for the semantic interoperability of ISO EN 13606 and OpenEHR archetypes," J. Biomed. Inform.,