IN CLOUD: CDA GENERATION AND INTEGRATION IN HEALTH INFORMATION EXCHANGE

DURGA GURU KUMAR CHIMAKURTHI[1], M.VENKATESWARA RAO[2], SK.KHALEELULLAH[3]

[1]Student, M.Tech (CSE), [2,3]Assistant professor,
Department of Computer Science & Engineering
LINGAYAS INSTITUTE OF MANAGEMENT & TECHNOLOGY, A.P., India.

Abstract : **The goal of cloud computing is to apply traditional supercomputing, or high-performance computing power, normally used by military and research facilities, to perform tens of trillions of computations per second, in consumer-oriented applications such as financial portfolios, to deliver personalized information, to provide data storage or to power large, immersive computer games. Electronic Health Record (EHR) is longitudinal collection of electronic health information for and about persons, where health information is defined as information pertaining to the health of an individual or health care provided to an individual and it can support of efficient processes for health care delivery. The Clinical Document Architecture (CDA) developed critical for interoperability. Badly, hospitals are not interested to adopt interoperable HIS because of its deployment cost except for in a handful countries.A problem arises even when more hospitals start using the CDA document format because the data spread in different documents are hard to manage. In this paper, we describe our CDA document generation and integration Open API service based on cloud computing, through which hospitals are allow to conveniently generate CDA documents without having to purchase proprietary software. Our CDA document integration system integrates multiple CDA documents per patient into a single CDA document and doctor 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 in Open API.**

Keywords: CDA, software as a service, Open API. Cloud computing.

INTRODUCTION

The cloud computing uses networks of large groups of servers typically running low-cost consumer PC technology with specialized connections to spread data-processing chores across them. This shared IT infrastructure contains large pools of systems that are linked together. Often, virtualization techniques are used to maximize the power of cloud computing. In order to ensure successful operation of EHR, a Health Information Exchange (HIE) system is needed in place. However, most of the HIS in service are different and incompatible. Hence, 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. CDA (Clinical Document Architecture) by Health Level Seven is a major standard for clinical documents. CDA is a document markup standard that specifies the structure and semantics of 'clinical documents' for the purpose of exchange. The first version of CDA was developed in 2001 and Release 2 came out in 2005. Many CDA-based projects have been successfully completed in many countries. Active works are being done on improving semantic interoperability based on open EHR and CEN13606. To ensure interoperability of HIE, the number of HIS that supports CDA needs to be sufficiently large. 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. In addition, 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, there is a resistance towards new systems unless it is absolutely necessary for provision of care. As a result, the adoption rate of EHR is very low except for a few handful countries such as New Zealand or Australia. The US Government runs the Meaningful Use Program to improve efficiency in healthcare and patient safety. This program was launched as a part of incentives to raise the EHR adoption rate for EHR adopting hospitals. The CDA document pertaining to a patient is generated at the clinic where the patient is diagnosed. The generated CDA document can be sent to other clinics after patient's consent is acquired. 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: when a physician needs to refer to the patient's medical history; when referral and reply letters are needed for a patient who is being taken care of by multiple clinics; when the patient is in an emergency and the medical history needs to be reviewed.

PROPOSED 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.

LITERATURE SURVEY

S. Lee, J. Song, and I. Kim,[1] proposed clinical document architecture integration system to support patient referral and reply letters. Many Clinical Document Architecture (CDA) referrals and reply documents have been accumulated for patients since the deployment of the Health Information Exchange System (HIES) in Korea. Clinical data were scattered in many CDA documents and this took too much time for physicians to read. Physicians in Korea spend only limited time per patient as insurances in Korea follow a fee-for-service model. Therefore, physicians were not allowed sufficient time for making medical decisions, and follow-up care service was hindered. To address this, we developed CDA Integration Template (CIT) and CDA Integration System (CIS) for the HIES. The clinical items included in CIT were defined reflecting the Korean Standard for CDA Referral and Reply Letters and requests by physicians.

S. R. Simon, R. Kaushal, P. D. Cleary, C. A. Jenter, L. A. Volk, E. G. Poon, E. J. Orav, H. G. Lo, D. H. Williams, and D. W. Bates,[2] presented correlates of electronic health record adoption in office practices: A statewide survey in which despite emerging evidence that electronic health records (EHRs) can improve the efficiency and quality of medical care, most physicians in office practice in the United States do not currently use an EHR. We sought to measure the correlates of EHR adoption.

CONCLUSION

The paper proposed a CDA document generation system that generates CDA documents on different developing platforms and CDA document integration system that integrates multiple CDA documents scattered in different hospitals for each patient.The CDA document format a clinical information standard planed to guarantee interoperability between hospitals.CDA document generation and integration system based on cloud server is more helpful over existing services for CDA document if the variety of CDA document increases.

REFERENCES

[1] K. Ashish, "Meaningful use of electronic health records the roadahead,"JAMA, vol. 304, no. 10, pp. 1709−1710, 2010.
[2] S. M. Huff, R. A. Rocha, C. J. McDonald , G. J. De Moor, T. Fiers, W. D. Bidgood, A. W. Forrey, W. G. Francis, W. R. Tracy, D. Leavelle, F. Stalling, B. Griffin, P. Maloney, D. Leland, L. Charles, K. Hutchins, and J. Baenziger, "Development of the logical observation identifier names and codes (loinc) vocabulary," J. Am. Med. Inform. Assoc., vol. 5, pp. 276–292, 1998.
[3] J. D. D'Amore, D. F. Sittig, A. Wright, M. S. Iyengar, and R. B. Ness, "The promise of the CCD: Challenges and opportunity for quality improvement and population health," in Proc. AMIA Annu. Symp.Proc., pp. 285–294, 2011.
[4] KS X 7504 Korean Standard for CDA Referral Letters (Preliminary Version)
[5] KS X 7505 Korean Standard for CDA Reply Letters (Preliminary Version)
[6] S. Lee, J. Song, and I. Kim, "Clinical document architecture integration system to support patient referral and reply letters," Health Informat. J., Published online before print Jun. 2014.
[7] S. Yi, A. Andrzejak, and D. Kondo, "Monetary cost-aware check pointing and migration on amazon cloud spot instances," IEEE Trans. Services Comput., vol. 5, no. 4, pp. 512–524, Nov. 2012.
[8] M. Armbrust, A. Fox, R. Griffith, A. D. Joseph, R. Katz, A. Konwinski, G. Lee, D. Patterson, A. Rabkin, I. Stoica, and M. Zaharia, "A view of cloud computing," Commun. ACM, vol. 53, no. 4, pp. 50−58, 2010.