

Enabling Clinical Health Information Exchange in Cloud Storage using CDA

T Jaya Sridevi¹, G E Sastry², M Shyam Kumar³

¹M.Tech Scholar, Dept. of Computer Science and Engineering,

^{2,3} Assistant Professor, Dept. of Computer Science and Engineering, Narasaraopeta Engineering College, Narasaraopet, Guntur, AP, INDIA.

Corresponding Author: T Jaya Sridevi

Abstract: These days modern Health Information Exchange (HIE) should be homogeneous for interoperable health information exchange between clinics. In this paper, to guarantee interoperability, CDA (Clinical Document Architecture) report age and incorporation benefit has been given. Interoperability between doctor's facilities not just aides in enhancing tolerant wellbeing and nature of consideration yet additionally consolidate time and assets spent on information design transformation. The methodology to be conveyed for guaranteeing interoperability has empowered to create CDA documents in open API benefit that depends on distributed computing so that the healing centers can helpfully produce CDA documents. After CDA archive age, with individual to CDA record incorporation system coordinates various CDA documents and make them to peruse in sequential request. With the presence of this administration, it ends up pointless for healing facilities to prepare their work force to create, incorporate, and see standard-consistent CDA documents.

Keywords: Clinical Document Architecture (CDA), Electronic Health Record (EHR). CDA, cloud computing.

Date of Submission: 29-11-2018

Date of acceptance: 13-12-2018

I. INTRODUCTION

The health information that comprises health of the patient, health care gave to that persistent and additionally the response of the patient to the grave healthcare can be put away as electronic health information as longitudinal accumulation, accordingly framing an Electronic Health Record (EHR) [1]. In this way, the usage of HIE system is made to guarantee fruitful upkeep of EHR [2]. However, there is likewise an issue of contrariness among systems and furthermore there are diverse attributes associated with HIS [3], [4]. Along these lines, there is a need to institutionalize the health information exchange between doctor's facilities guaranteeing interoperability over health information. Consequently, the center of ensuring interoperability is to institutionalize the clinical archive. The real standard for clinical documents is CDA which was set up by Health Level Seven (HL7). CDA is the center record standard, a XML report which holds the structure and semantics of clinical documents for health information exchange. The main adaptation of CDA was discharged on 2001 and its second form was discharged on 2005. Numerous nations have done numerous fruitful ventures receiving CDA [7], [8], [9]. To enhance semantic interoperability, numerous dynamic works are done dependent on openEHR and CEN3606 [10]. More HIE system needs to help CDA to set up trust in interoperable Health Information Exchange. Also, the structure of CDA is excessively mind boggling and the right CDA Document creation is troublesome without the great comprehension of the CDA standard and enough involvement with it. Likewise, the HIS advancement stages for doctor's facilities contrast so significantly so that age of CDA documents in each healing facility constantly requires a different CDA age system. Notwithstanding that, healing centers declines to receive another system except if it is consummately fundamental for conveyance of consideration. Therefore, aside from just couple of bunch nations like New Zealand or Australia, the appropriation rate of EHR is too low. To advance EHR reception among healing facilities, the USA government had actualized a motivating force program called the Meaningful Use Program [13]. At the point when a patient is analyzed at a facility, a CDA archive recording the finding is created. The CDA report can be imparted to different centers if the patient concurs. The idea of family specialist does not exist in Korea, subsequently usually for a patient to visit various diverse facilities. The exchange of CDA record is activated in the accompanying cases: when a doctor needs to examine a patient's therapeutic history; when referral and answer letters are drafted for a patient minded by various facilities; when a patient is in crisis and the medicinal history should be surveyed. It requires expanding measure of investment for the medicinal faculty as the measure of exchanged CDA record increments since more documents implies that information are disseminated in various documents. This unquestionably defers the medicinal staff in deciding. Along these lines, when all the CDA

documents are coordinated into a solitary report, the restorative work force is roused to see the patient's therapeutic history helpfully in sequential request per clinical segment and the relating care administration can be given all the more adequately. Tragically until further notice, an answer that incorporates numerous CDA documents into one don't exist yet to the best of our insight and there is a reasonable impediment for individual doctor's facilities to create and execute a CDA record joining interface. The advantages of actualizing this system are as per the following. To start with, the system can be gotten to through an Open API and engineers can keep chipping away at their designer stages they are specific for instance Java, .NET, or C/C++. Healing center systems can just expand their current system rather than totally supplanting it with another system. Second, the healing centers don't need to prepare their work force to produce, incorporate, and see standard-consistent CDA documents. The cloud based CDA age benefit produces documents in the CDA design endorsed by the National Institute of Standards and Technology (NIST). Third, as these administrations are without given of expense at low cost to doctor's facilities, existing Electronic Health Record are bound to consider selection of CDA in their practices.

II. RELATED WORK

K. Ashish,[1] displayed significant utilization of electronic health records the street ahead. For rehearsing clinicians, the sources and likely impacts of this standard might be misty. It is useful to comprehend the inspiration driving the key segments of the important utilize rules, where they are probably going to take the US health care system (and the obstructions en route), and the advantages and dangers of a fast change from paper to electronic record systems. J. D. D'Amore, D. F. Sittig, A. Wright, M. S. Iyengar, and R. B. Ness,[3] proposed the guarantee of the CCD: difficulties and open door for quality enhancement and populace health. Interoperability is a prerequisite of later electronic health record (EHR) appropriation motivation programs in the United States. One affirmed structure for clinical information exchange is the progression of consideration archive (CCD). While essentially intended to advance correspondence between suppliers amid consideration changes, coded information in the CCD can be re-used to total information from various EHRs. This gives a chance to supplier systems to gauge quality and enhance populace health from a combined database. To assess such potential, this examination gathered CCDs from 14 associations and built up a PC program to parse and total them. M. Armbrust, A. Fox, R. Griffith, A. D. Joseph, R. Katz, A. Konwinski, G. Lee, D. Patterson, A. Rabkin, I. Stoica, and M. Zaharia,[6] displayed a perspective of distributed computing which portrays distributed computing. Writer's objective in this is to decrease that perplexity by clearing up terms, giving basic figures to measure correlations between of cloud and traditional registering, and recognizing the best specialized and non-specialized snags and chances of distributed computing. S. Lee, J. Melody, and I. Kim,[8] proposed clinical archive design combination system to help persistent referral and answer letters. Numerous Clinical Document Architecture (CDA) referrals and answer documents have been gathered for patients since the sending of the Health Information Exchange System (HIES) in Korea. Clinical information were scattered in numerous CDA documents and this set aside an excess of time for doctors to peruse. Doctors in Korea invest just constrained energy per understanding as protections in Korea pursue a feefor-benefit display. Consequently, doctors were not permitted adequate time for settling on restorative choices, and follow-up consideration benefit was upset. To address this, we created CDA Integration Template (CIT) and CDA Integration System (CIS) for the HIES. The clinical things incorporated into CIT were characterized mirroring the Korean Standard for CDA Referral and Reply Letters and demands by doctors. 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,[11] exhibited connects of electronic health record reception in office rehearses: A statewide study in which notwithstanding developing proof that electronic health records (EHRs) can enhance the proficiency and nature of medicinal consideration, most doctors in office practice in the United States don't presently utilize an EHR. We tried to quantify the relates of EHR appropriation.

III. METHODOLOGY

Hospitals document request, transformation can be authorized by the dean of the hospital. Hospital document request, transformation is maintained by dean of the hospital. The dean has own unique Id and password. The documents are stored in the hospital database. Consider a patient is transferred from hospital A to hospital B, if hospital requires details of patient, then a request is send to Hospital A with unique Id. Document is transferred to requested hospital. The CDA is generated for the requested patient Id that contains the details about the patient health history. The CDA document, patient details, doctor details are stored in the database. The patient documents requested are stored in cloud server so that it can be accessed by other hospitals.

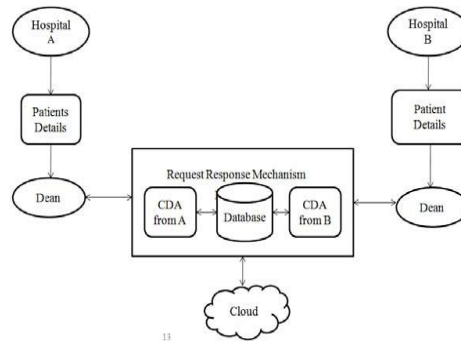


Fig 1: Architecture Diagram

A. Patient registration and doctor login

- Every patient who visits the hospital has to get registered prior to getting any consultation, treatment or investigations done.
- The patient is allocated a unique Registration number and Patient Identification number. Parents who will come to a hospital with different types of disease, will register and get an appointment from the admin then consult doctor. The module allows the doctor details on department wise.

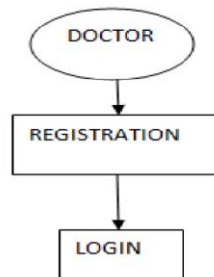


Fig 2: Doctor Registration and Login

B. CDA generation

- CDA is a popular flexible markup standard document. That defines structure of certain medical records and way to exchange this information between providers and patients.
- It allows health care providers to create digit document contain patient information. That they might wish to send to other health care providers.

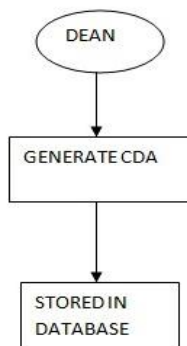


Fig 3: Generating CDA

C. Transferring document

- The patient is transferred when requested from other hospital. Consider that one hospital application in jav platform, another application in .net. If one hospital refer patient to another hospital sharing the patient details to another hospital through cloud.
- Multiple documents of patient details together into single CDA document. These cloud can integrate this java and .net platforms.

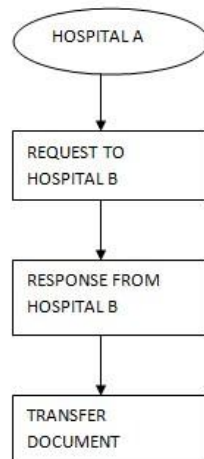


Fig 4: Transferring Patient Document

IV. PROPOSED METHOD

We describe our CDA document generation and integration Open API service supported cloud computing, through that hospitals are enabled to handily generate CDA documents while not having to buy proprietary computer code. Our CDA document integration system integrates multiple CDA documents per patient into one CDA document and physicians and patients will browse the clinical knowledge in written record order. The CDA document relating a patient is generated at the clinic wherever the patient is diagnosed. The generated CDA document will be sent to different clinics when patient's consent is inheritable. The conception of GP doesn't exist in Korean Peninsula, hence it's common for a patient to go to variety of various clinics. The exchange of CDA document is triggered within the following cases: once a doc has to check with the patient's case history; once referral associated reply letters are required for a patient UN agency is being taken care of by multiple clinics; once the patient is in an emergency and also the medical history has to be reviewed. Our system configuration is that, our system guarantee security of patient's knowledge and supply QR code security. Once patient switch one hospital to a different then new hospital scan QR code and obtain patients personal data through QR code.

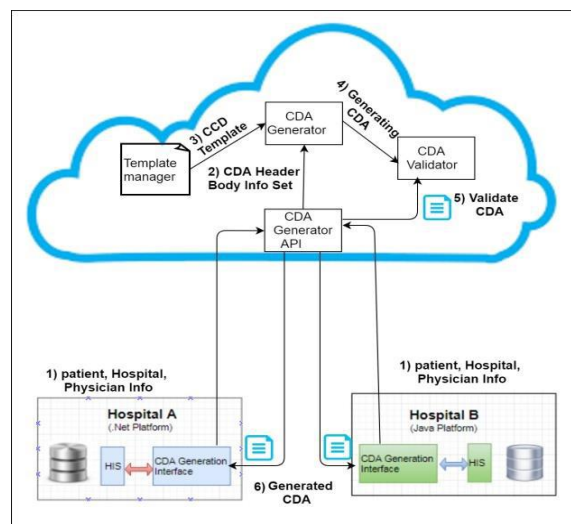


Fig 5. proposed Architecture diagram

V. CONCLUSION

Interoperability between hospitals not solely facilitate improve patient safety and quality of care however conjointly scale back time and resources pay on formatting conversion. ability is treated additional necessary because the range of hospitals taking part in hasten will increase .if one hospital doesn't support ability ,the other hospitals square measure needed to convert formatting of their clinical data to exchange information for hasten. Once the amount of hospitals that don't support ability, quality for hasten inevitably increase in proportion. The advantage of API service as ours square measure at the number of resources that hospitals got to assign for ability is merely tokenish. Therefore, providing system that supports ability by

counting on a cloud computing platform could also be smart and that we offer the QR code security for patient's information that hold on cloud.

Future work will consent with the security of the electronic health records in the cloud storage. There is ample evidence that cloud computing is effective and efficient in cost reduction, and the medical field seems to be no exception [6]. Security and Stability is improved in the future and even the efficiency is improved when multiple users login at the same time.

REFERENCES

- [1]. CDA Generation and Integration for Health Information Exchange Based on Cloud Computing System Sung-Hyun Lee, Joon Hyun Song, and Il Kon Kim IEEE TRANSACTIONS ON SERVICES COMPUTING, VOL. 9, NO. 2, MARCH/APRIL 2016.
- [2]. Mr. Amitav Mahapatra, Mr. Manoranjan Dash, —Design and Implementation of a Cloud based TeleDermatology System International Journal of Engineering Research & Technology (IJERT), Vol. 2 Issue 2, February- 2013
- [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]. Sung-Kyun Lee, Joon Hyun Song, and Il Kon Kim, CDA Generation and Integration for Health Information Exchange Based on Cloud Computing System
- [5]. R. H. Dolin, L. Alschuler, C. Beebe, P. V. Biron, S. L. Boyer, D. Essin, E. Kimbers, T. Lincoln, and J. E. Mattison, —The HL7 Clinical Document Architecture, J. Am. Med. Inform. Assoc., vol. 8, pp. 552–569, 2001.
- [6]. M. Eichelberg, T. Aden, J. Riesmeier, A. Dogac, — A Survey and Analysis of electronic healthcare record standards, ACM Computing Surveys, Vol. V, No. N, 20YY, Pages 1–47.
- [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]. C. Ng and P. Lee. Revdedup, —A Secure Anti-Collusion Data Sharing Scheme for Dynamic Groups in the Cloud IEEE Transaction on parallel computing
- [9]. J. Lahteenmaki, J. Leppanen, and H. Kaijanranta, —Interoperability of personal health records, Conf Proc IEEE Eng Med Biol Soc. 2009;2009:1726-9. doi: 10.1109/IEMBS.2009.5333559
- [10]. Marwan Sabbouh, Kenneth McCracken, Geoff Cooney, —Data Sharing for Cloud Computing Platforms, IEEE Conf on Big data, 2014

T Jaya Sridevi. "Enabling Clinical Health Information Exchange in Cloud Storage using CDA." IOSR Journal of Engineering (IOSRJEN), vol. 08, no. 12, 2018, pp. 84-88.