

A Strategy for Secured Uploading of Encrypted Microdata in Cloud Environment

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Abstract: For the past few years, cloud computing has been grabbed considerable attention in improving the business world by providing organization with innovative ideas to save money, improve operations and gain access to the next generation application. Mobile cloud computing platforms represent a more secure way for provisioning applications and online services to users over social networks. Security and privacy preservation is the main expectation of the cloud users in Mobile based cloud servicing. Cloud storage provides a convenient means of storing and retrieval of huge amount of data. Personal Health Records (PHRs) should remain the lifelong property of patients and should be displayable conveniently and securely to selected caregivers. MyPHRMachines a patient centric system that takes a radically new architectural solution to health record interoperability. Patients Can Upload their Medical data then they access and share through remote Virtual machine. This paper invades various methods of medical data uploading in cloud. Also this paper, addresses the issue of cloudlet creation and secured submission of encrypted file in cloud for years together.

Keywords: Cloud Computing, Mobile Cloud Computing, Cloud Servicing, Personal Health Records (PHRs), Virtual Machine

I. INTRODUCTION

Life-long patient record preservation is a unique feature that could be carried out in cloud. In MyPHRMachines [1], a patient owned health record system prototype based on remote virtual machines hosted in the cloud. MyPHRMachines is especially highly used in countries with a very assorted architecture of systems across hospitals and other health care organizations. A portable PHR system is what the current medical field is looking for to share, visualize and analyze PHR data. Secure lifelong management of patient medical records are guaranteed since data are stored in the cloud and patient need not carry the paper written record,

The remainder of the paper is organized as follows. Literature review of several techniques prevailing in literature aimed to secure the electronic health records in recent years are discussed in Section 2. The technical architectural representation of MyPHRMachine housing web portal, Virtual Box Hypervisor, VM Repository, VM Data and Private Network Folders is depicted in Section 3. Section 4 gives the detail stepwise method to upload medical data in cloud. The process of cloudlet creation and submission of encrypted file is discussed in Section 5. Section 6 concludes the paper and outlines the direction for future work.

II. LITERARY REVIEW

William R. Hogan, MD, Michael M. Wagner, MD, PHD (1997) [7] Accuracy of Data in Computer-based Patient Records defines that Computer based patient records have many uses in patient care. Data accuracy is an important issue factor in Computer based patient records (CPR), They explore high variable levels of accuracy. They

accomplish that our information of data accuracy in CPRs is not appropriate with its importance and additional studies are needed. Methodological guidelines are proposed for analyzing the accuracy of the shortcomings in the literature. Finally the improved accuracy should be applied to Computer based patient records (CPR).Laurence G. Branch, PHD (1985) [8] in "Health Practices and Incident Disability among the Elderly" explored that associations between certain personal health practices and point-incident physical confines such as no firm associations among recent lifestyle practices and onset of disability could be confirmed.

Eleanor M. Simonsick, PhD, Mary E. Lafferty, Caroline L. Philips, MS, Carlos F. Mendes de Leon, PhD, Stanislav V Kasl, PhD, Teresa E.Seeman, PhD, GerdaFillenbaum, PhD, Patricia Hebert, PhD, and Jon H.Lemke, PhD (1993) [9] in "Risk Due to Inactivity in Physically Capable Older Adults" explored the associations between the physical activity among adults and functional status. High level physical activity reduces the morality problem. Reduces the risk of functional decline and morality. They result to quantifiable measures of activity and asses over changes in activity over time.

Robert Steele, Kyongho Min, Amanda Lo (2012) [10] in "Personal Health Record Architectures: Technology Infrastructure Implications and Dependencies" define that electronic personal health records (PHRs) have several issues such as design, functional evaluation, privacy, security and architectural issues. To overcome the issues two infrastructural drivers such as ubiquitous technology and connectivity coverage which examine the relationship

between the two infrastructural drivers and architectural selection.

HebahMirza and Samir El-Masri [12] “Cloud Computing System for Integrated Electronic Health Records” defines that application of information and communication technology improves its service quality. Many challenges are to be considered in health care process such as cost, Maintenance and security threats. Cloud computing is a new paradigm which involves in large positive changes in health care process and maintenance. Here they propose innovative Healthcare Cloud Computing system for Integrated Electronic Health Records (EHRs) provides an environment for EHRs. They have Cloud’s Central Database that represents the data repository for EHR’s. Unifier Interface Middleware and the web portal for the secure connections.

Abhishek Kumar Gupta, Kulvinder Singh Mann (2014) [13] in “Sharing of Medical Information on Cloud Platform-A Review” explore that sharing of medical information from one health care institution to another health care institution is ideal process in medical field. Aim is to provide a secure transformation of information is important. Also at Present in many institutions data in printed paper format is maintained which may result in data loss in any certain manner. online medical information transfer system through cloud computing opens more transferred platform for exchange and collaboration of medical information.

Carmelo Pino and Roberto Di Salvo (2013) [14] in “A Survey of Cloud Computing Architecture and Applications in Health” defined that Clinical community need a better resource for the development of medical techniques. Cloud computing provides a new adoption and application. High performance data processing is attained through cloud computing. Cloud computing has several advantages such as resource management and computational capabilities. Different applications and services are explored and resulted that use of cloud computing increase the health care sector in all aspects.

Peter L. Reichertz (2006) [15] in “Hospital information systems - past, present, future” defined that Health Information system (HIS). HIS have become one of the most stimulating and hopeful fields of research, education and repetition for medical informatics, with important benefits to medicine and health care in general. HIS include ubiquitous computing environments and sensor-based technologies for health monitoring. Paper based health data maintenance has changed to computerized and now through online.

III. TECHNICAL ARCHITECTURAL REPRESENTATION

Architectural representation of MyPHR Machine consists of two components evolution and storage with which client directly interacts with MyPHR Machine. The first component of MyPHR Machine consists of web portal which in turn interacts with Virtual Box Hypervisor. Virtual Machines are connected together with Virtual Box Hypervisor. The second component of MyPHR Machine, storage consists of VM Repository which houses VM Data and Private Network folders as indicated in Figure 1.

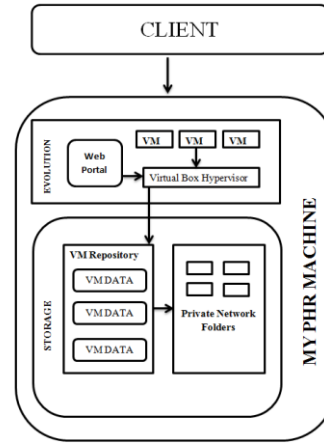


Fig. 1. Technical Architectural diagram of Cloud Based PHRs storage

IV. MEDICAL DATA UPLOADING IN CLOUD

In order to maintain proper access and to secure data use a combination of techniques such as Encryption this means using a complex algorithm to encode information. Whereas to decode the encrypted files a user needs the encryption key. While it's potential to crack encrypted information, most unauthorized user doesn't have access to the amount of computer processing power they would need to decrypt information. When the file is been uploaded in cloud environment it encrypt the file to prevent from the unauthorized user. A generated key analyze the file and Key size is specified. The fact is illustrated in Fig 2.

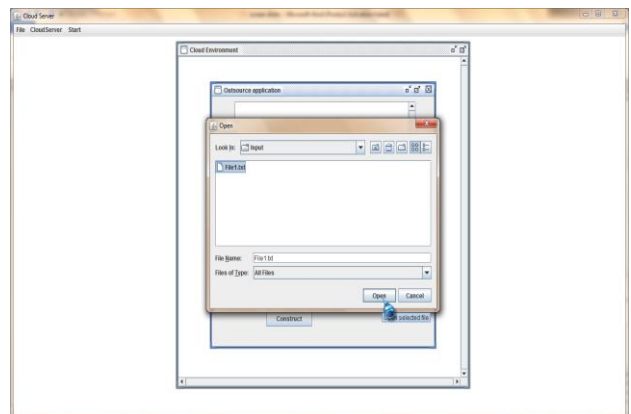


Fig 2: Uploading the medical data in cloud

V. CLOUDLET CREATION AND SUBMISSION OF ENCRYPTED FILE

Cloudlet is created, now the patient who has a bonding with the specified organization or Doctor can view their descriptive file but only the authenticated user can access the file. To secure the health details of the patient different types of encryption schemes are used. Advanced Encryption Standard is used for encryption because it performs both symmetric and asymmetric compare to other terminology. Other encryptions schemes are also used but all suffers from certain issues such as key size, complexity, time, cost etc. File may contain information such but not limited to allergies and adverse drug

reactions, chronic diseases, family history, illnesses and hospitalizations, imaging reports (e.g. X-ray), laboratory test results, medications and dosing, prescription record, surgeries and other procedures, vaccinations and Observations of Daily Living (ODLs).

If a patient undergoes any surgery the details are stored in cloud so any other surgical the doctor may need to know the previous surgical problem, so if the details are avail it will be very useful for doctor to provide treatment according to that so the doctor undergo the surgical history details which are stored in cloud. After uploading their medical data in cloud, patients can access them again from remote virtual machines. Caregivers need not be able to run specialist software, since they can't get access to this software directly from the cloud to visualize and analyze them without any need for conversion. The process of cloudlet creation and submission of encrypted file is depicted in Fig 3.

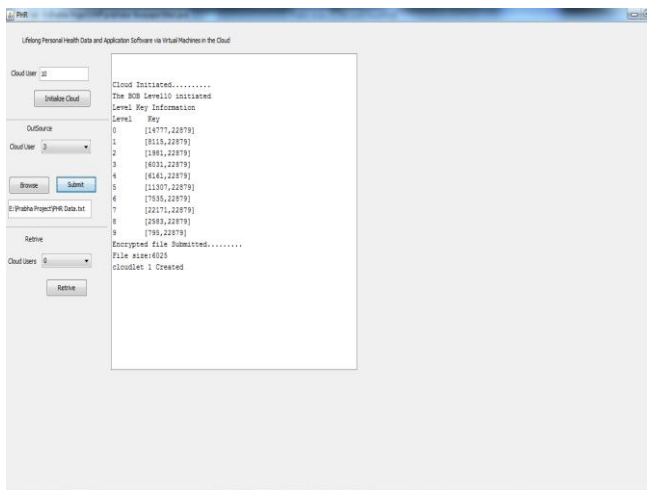


Fig 3: Submission of Encrypted file and cloudlet creation

VI. CONCLUSION AND FUTURE WORK

This paper invaded various methods of medical data uploading in cloud. Also this paper, addressed the issue of cloudlet creation and secured submission of encrypted file in cloud for years together. Mobile cloud computing platforms present a more secure way for provisioning applications and online services to users over social networks. Security and privacy preservation is the main expectation of the cloud users in Mobile based cloud servicing. Cloud storage provides a convenient means of storing and retrieval of huge amount of data. Personal Health Records (PHRs) should remain the lifelong property of patients and should be displayable conveniently and securely to selected caregivers. MyPHRMachines a patient centric system that takes a radically new architectural solution to health record interoperability. Patients Can Upload their Medical data then they access and share through remote Virtual machine. As a part of future work, we have planned to Invade New Strategies of Prevention Mechanism from Unauthorized User and also to devise certain mechanisms to securely retrieve from authorized user.

REFERENCES

- Pieter Van Gorp and Marco Comuzzi "Lifelong Personal Health Data and Application Software via Virtual Machines in the Cloud" IEEE Journal of Biomedical and Healthcare Informatics, Vol. 18, No. 1, Jan 2014
- Pieter Van Gorp and Marco Comuzzi (2014) Lifelong Personal Health Data and Application Software via Virtual Machines in the Cloud, IEEE Journal of Biomedical And Health informatics.
- Richard Lenz, Manfred Reichert (2006) IT support for healthcare processes– Premises, challenges and perspectives, Elsevier.
- GoceGavrilov, Vladimir Trajkovik (2012) Security and Privacy Issues and Requirements forHealthcare Cloud Computing, ICT Innovations 2012 Web Proceedings
- Sean M. Randall Anna M. Ferrante, James H. Boyd, James B. Semmens (2013) ,Privacy-preserving record linkage on large real world datasets, Elsevier.
- J. Vidhyalakshmi, J. Prassanna (2012) Providing a trustable healthcare cloud using an enhanced accountability framework.
- M. Poulymenopoulou, F. Malamateniou, D.Papakonstantinou , G. Vassilacopoulos (2011) Cloud-based Information Support forEmergency Healthcare.
- William R. Hogan, MD, Michael M. Wagner, MD, PHD (1997) Accuracy of Data in Computer-based Patient Records .
- Laurence G.Branch, PHD (1985) Health Practices and Incident Disability among the Elderly, Public health briefs.
- Eleanor M. Simonsick, PhD, Mary E. Lafferty, Caroline L. Philips, MS,Carlos F. Mendes de Leon, PhD, Stanislav V Kasl, PhD, Teresa E.Seeman, PhD, GerdaFillenbaum, PhD, Patricia Hebert, PhD, and Jon H.Lemke, PhD(1993) Risk Due to Inactivity in Physically Capable Older Adults, American journal of public health.
- Robert Steele, Kyongho Min, Amanda Lo (2012) Personal Health Record Architectures: Technology Infrastructure Implications and Dependencies.
- HebahMirza and Samir El-Masri, Cloud Computing System for Integrated Electronic Health Records.
- Abhishek Kumar Gupta, Kulvinder Singh Mann (2014) Sharing of Medical Information on Cloud Platform-A Review, IOSR Journal of Computer Engineering.
- Carmelo Pino and Roberto Di Salvo (2013) A Survey of Cloud Computing Architecture and Applications in Health, International Conference on Computer Science and Electronics Engineering.
- Peter L. Reichertz (2006) Hospital information systems - past, present, future, International Journal of Medical Informatics.
- Arindam Banerjee, PrateekAgrawal and R. Rajkumar (2013) Design of a Cloud Based Emergency Healthcare Service Model, International Journal of Applied Engineering Research.
- Louise Olsson, Gunnel Östlund, Peter Strang, Eva JeppssonGrassman, Maria Friedrichsen (2010) Maintaining hope when close to death: insight from cancer patients in palliative home care.
- K.S. Aswathy, G. Venifa Mini (2014) Secure Alternate Viable Technique of Securely Sharing the Personal Health Records in Cloud, International Journal of Recent Development in Engineering and Technology.
- Jithendra K, Thanapal P, Prabhu J (2013)Developing Secure Social Healthcare System over the Cloud, International Journal of Science and Research (IJSR), India Online ISSN: 2319-7064.
- L G Branch and A M Jette. Personal health practices and mortality among the elderly. American Journal of Public Health.
- Jean Harvey-Berino, Stephen Pintauro, Paul Buzzell, and Elizabeth Casey Gold (2004) Effect of Internet Support on the Long-Term Maintenance of Weight Loss.
- Balamurugan Shanmugam, Visalakshi Palaniswami, "Modified Partitioning Algorithm for Privacy Preservation in Microdata Publishing with Full Functional Dependencies", Australian Journal of Basic and Applied Sciences, 7(8): pp.316-323, July 2013
- Balamurugan Shanmugam, Visalakshi Palaniswami, R.Santhya, R.S.Venkatesh "Strategies for Privacy Preserving Publishing of Functionally Dependent Sensitive Data: A State-of-the-Art-Survey", Australian Journal of Basic and Applied Sciences, 8(15) September 2014.
- V.M.Prabhakaran, Prof.S.Balamurugan, S.Charanyaa," Certain Investigations on Strategies for Protecting Medical Data in Cloud", International Journal of Innovative Research in Computer and Communication Engineering Vol 2, Issue 10, October 2014

- [25] V.M.Prabhakaran, Prof.S.Balamurugan, S.Charanyaa," **"Principles of Social Network Data Security", ISBN: 978-3-659-61207-7.** Investigations on Remote Virtual Machine to Secure Lifetime PHR in Cloud ", International Journal of Innovative Research in Computer and Communication Engineering Vol 2, Issue 10, October 2014
- [26] V.M.Prabhakaran, Prof.S.Balamurugan, S.Charanyaa," Privacy Preserving Personal Health Care Data in Cloud" , International Advanced Research Journal in Science, Engineering and Technology Vol 1, Issue 2, October 2014
- [27] S.Balamurugan, S.Charanyaa, "Principles of Social Network Data Security" LAP Verlag, Germany, ISBN: 978-3-659-61207-7, 2014.

BIOGRAPHIES



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